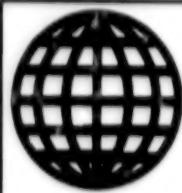


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12 MARCH 1990



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JPRS Report

Science & Technology

***USSR: Science &
Technology Policy***

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Economist on Increasing Effectiveness of Applied Research

907A0123A Moscow NTR TRIBUNA in Russian
No 1-2, 19 Jan 90 p 6

[Article by Candidate of Economic Sciences V. Belousov (Voronezh): "Talented People and Clients"; first paragraph is NTR TRIBUNA introduction]

[Text] We have already uncovered many mistakes in the management of scientific and technical progress. But thus far we have not reached the mistake which consists, so it seems to me, in the unfair "assignment of roles" between science and invention.

Today priority is being persistently given to science and scientists. Inventors are regarded first of all as craftsmen who are sitting on the shoulder of a highway which is filled with animated scientific traffic (the attitude toward invention is also in accord with this notion). Is this so? If we look into it, the inventor, after all, carries his own "suitcase" in the line of those ascending the heights of scientific and technical progress. Neither science, designers, nor production workers carry this "suitcase."

The history of civilization does not know a single case of the passage of a scientific idea into practice, bypassing the invention. And if now scientific ideas in our country are lying on shelves, it is only because inventors are avoiding the development on their basis of practical concepts of machines and technologies.

The crisis of invention, which has befallen our country, can be overcome only simultaneously with the thorough restructuring of the economic mechanism, first of all on the basis of the new ideas about socialist property. It is necessary to accept primarily a market economic mechanism based on a large number of forms and types of socialist property. This will place the inventor in the position of a partner of the producer.

The assimilation of the new economic thinking requires coincident changes in the strategy and tactics of the management of invention. Quite a number of these changes have to be made. Let us dwell on just three important things.

First, we should reject the priority of a mass character and carry this priority over to the technical and economic level. And here is why. It is well known that the interests of the system, which supports current production, are dominant. By virtue of this it has the tendency to suppress the functioning of the system of the development of production. Consequently, the special stimulation of the latter is needed. Otherwise the system of current production will strive to reject innovations. The turn toward a market mechanism makes the producer himself interested in the use of the achievements of scientific and technical progress. Under the conditions of a market economy the time of the retention of some object in production depends on the initial scientific and

technical level of the inventions that have been incorporated in this object. The higher the level is, the longer the changeover of production to the assimilation of a new product is not required. In this connection it is easy to understand that, having directed our attention to the priority of trivial things and cosmetic modernizations, we are thereby increasing for ourselves the amount of organizational work: Not having managed to introduce a single trivial thing, we already see that the product, which has been made on its basis, has lost competitive ability. As a result we are forced to make a new search, but again adopt an inventive idea that is not fitting in level. Here we have wallowed in trivial things and fussing, instead of engaging in effective business.

Second, I believe that we should select a different tactic in the use of the intellectual potential. For one of the main traits of the restructuring being carried out is the fact that the country intends to switch to a different type of productive forces: the scientific and technical type. Hence, we need to reject the catch-up strategy of development, which orients us toward a controlled scientific and technical lag. A minimum of three models of the restructuring of scientific and technical activity are visible from current practice.

The first model is the economic model. The supporters of this model argue as follows: We will change science and invention over to full cost accounting, and, they say, what becomes of talented people? They will be obedient to the client. So what, the aspiration to immerse science and innovation deeper into the economic environment is a healthy and correct idea. This model is implemented on the basis of the following principles: full cost accounting; the product of science and invention is regarded as a commodity; not the organization, but the solution, theme, and problem are financed; the contract, the state order, bank credit, internal assets, assets from victories in competitions, and assets from the issuing of securities are chosen as the sources of the financing of scientific and technical organizations.

However, this model, so it seems to me, is not without drawbacks. There is the danger of the dictation of the focus on petty themes and an orientation in development toward the stopping up of current cost accounting holes.

The second model is the organizational model. At its basis are democratization in the world of science and technology and the weakening of administrative levers in the management of the activity of scientific and technical organizations. This model is characterized by the increase of the diversity of the forms of the organization of scientific and engineering activity, including the assimilation of flexible and risky forms. These are various scientific technical complexes, centers, engineering and technical cooperatives, and temporary creative collectives. Within this model the principle of the replaceability and interchangeability of personnel and restrictions on the age of tenure in scientific management positions is becoming widespread.

But this model also has its drawback. It is the fact that there is also not ruled out here the possibility, when within the framework of democratic procedures people, who are by no means disposed to disturbing the scientific peace, are promoted to managers. The appeal for the increase of the role of the creative individual and the early identification of a talented person may remain just a slogan, if the choice of people for scientific positions occurs only in accordance with the principle of the majority of votes.

The arrival in science and technology of the needed leaders is possible only when the survival of the enterprise in the competitive struggle depends on the quality of the innovations which it has adopted. Only the attainment by the product of the enterprise of the highest world level will enable it under the conditions of cost accounting in case of the multiplicity of forms of property to keep afloat. This goal is achieved by the now realized third model of the development of scientific and engineering activity—the innovation model. At its basis are the changeover to the accomplishment of priority special-purpose tasks and the assimilation of inventors' ideas, which ensure the exceeding of the highest world level.

Now the third, final thing (continuing the idea about the changes in the strategy and tactics of the management of invention). This is the financing of inventive activity under the conditions of cost accounting. The enforceable enactments being promulgated by inertia contain direct instructions with regard to the sources of the financing of invention, moreover, they primarily direct attention to the use for this purpose of the cost accounting revenue and economic stimulation funds. Such an orientation, in my opinion, is mistaken. Among economists there has not yet been achieved a clear understanding of what here is the expenditures and, hence, should be attributed to the production cost, and what is the result, from which the innovator should receive his share.

I propose to direct attention to two circumstances: First, before obtaining a result (revenue, a decrease of the expenditures on production), it is necessary to make expenditures on the payment for the intellectual product, which provides increased receipts and the gross and then the cost accounting revenue of the enterprise. Among such expenditures are: the author's reward, the material expenditures on the introduction of inventions and the serving of innovators, the cost of licenses, and so on.

Second, the positive impact from the implementation of the results of inventive activity appears in various directions: the decrease of the production cost, the increase of the output of products and the derivation due to this of an additional profit, the obtaining of an impact by the consumer in case of an increase of the expenditures for the producer (the producer can take his interest into account in the contract price for the product).

The content of the impact should also determine the source of financing of invention under the new conditions of management. The indication from above of some source of financing, and especially the aspiration to force the enterprise to pay for the expenditures on invention from the portion of the profit, which is left to it, are a means of intensive taxation, since the actual revenue of the enterprise is overstated. The following model of the financing of invention in case of different forms of management, so it seems to me, would be economically just. The current expenditures on invention (the payment for the infringement of patent rights, the conducting of mass organizational measures, the serving of innovators, the expenditures of the present period on the implementation of inventions, and others) should be included in the material expenditures on production. The long-term capital expenditures in the investment of fixed and working capital (fixed and working assets) for the organization of expanded reproduction should be financed from the remaining profit (the entrepreneurial revenue) of the enterprise. In other words, by means of the remaining profit, which in conformity with the Fundamentals of Legislation of the USSR and the Union Republics on the Lease is placed at the full disposal of the leasing enterprise.

As to the cost accounting relations within the enterprise, here we will not succeed in avoiding serious structural rearrangements, which are connected first of all with the formation of subdivisions which have the rights of the owner of specific end results. For example, the following version of the lease is possible for bureaus for rationalization and invention and patent information subdivisions. A fund of assets in the amount of half the sum of the saving from the introduction of inventions and efficiency proposals is allocated to the subdivision. All organizing activity on the development of the innovators' movement at the enterprise: The identification, registration, and introduction of innovations, leasing or the payment for services on the examination and implementation of proposals, the payment of the reward to the authors and various bonuses, the conducting of mass organizational measures, is carried out at the expense of the assets of this fund. The wage for the organizers of technical creativity is paid from this fund. It will depend on the results of the use of the intellectual potential of specialists of the enterprise. Given such an approach the organizer of technical creativity will not wait for proposals, but will begin to organize them.

Citation Index as Guide to Research Grants

907A0132A Moscow *PRIRODA* in Russian
No 1, Jan 90 pp 3-5

[Article by Candidate of Technical Sciences Valentina Aleksandrovna Markusova, head of a sector of the All-Union Institute of Scientific and Technical Information of the State Committee for Science and Technology and the USSR Academy of Sciences and specialist in the field of the theoretical principles of information science, under the rubric "The Organization of Science: "The Citation Index to the Aid of the Distribution of Grants"]

[Text] Starting in the early 1980's in all industrially developed countries, the policy of state allocations for scientific research began to change. In connection with this the need for the careful substantiation of the priority of scientific directions increased. Until the middle of the 1980's, the system of their review by leading specialists (whom in the foreign scientific press it is customary to call judges) served as the basic means of evaluating the significance of planned scientific programs. Now much is being written about the drawbacks of this system. They were clearly formulated in the work of English scientologist J. King.¹

- The bias of the judges (reviewers) in favor of projects that are submitted by prominent and powerful scientific centers. The preference of already well-known fields to new ones, which require development. (As foreign colleagues say, "the halo effect" and loyalty with respect to old colleagues play a role here.);
- The judges use different criteria for the evaluation of programs;
- The methods and forms of evaluation are also very different: in one case this is a short review that is sent in by mail, in another it is a visit to a laboratory by a group of reviewers;
- The review process implies that there exists a high level of agreement among scientists as to what is a good, qualified job, who is capable of performing it and how, and where the perspective line of research is (unfortunately, these factors might not operate in new fields).

An analysis, which was recently made in the United States on the order of the National Science Foundation, showed that in case of the distribution of subsidies—grants—the choice of programs is determined half by strictly substantiated recommendations and half by recommendations expressed at random. In another study, which was made on the order of the same organization, they asked a mixed group of scientists to answer the questions, to which of two proposals they would give preference: the one, which was received from an institute, which is world-famous, and is based on universally recognized notions, or, on the contrary, to a proposal from a little-known scientific institution, which contains radical ideas. The majority of respondents preferred the first version.

Of course, the review by leading specialists remains an essential element in the system of the financing of science, but the need for the improvement of the principles of the selection of programs is obvious. Precisely for this reason in recent years the people, who are responsible for science policy, and research managers have been directing close attention to bibliometric indicators. Among them are: the number of publications that belong to the authors of projects, the analysis of the frequency of citation of their works, charters, which have been compiled on the basis of joint citation, or clusters,² as well as data on the information significance of the journals, in which the works were published. E. Garfield, initiator of the establishment of the "Science Citation Index" and president of the U.S. Institute for Scientific Information, directed attention to the strict correlation between the indicators, which bibliometric methods yield, and such recognition of scientific services as the awarding of honorable prizes, including the Nobel Prize.³

The analysis of references is an extremely sensitive tool, which makes it possible to detect even changes that have just arisen. But only a well-trained specialist can use it properly. In the hands of a layman the data of the "Science Citation Index" (SCI) can be incorrectly interpreted.

When evaluating the activity of scientists and scientific collectives according to the data of the SCI one should take into account the nature of the references, including self-citations, their chronological distribution, the authoritativeness of the journal, in which the work was published, and the boundaries of the occurrence of the references both within the given scientific field and country and beyond these limits.

Of course, the references to one work or another in themselves say nothing about its essence, the reasons for its mention, and the real value. But it is obvious that every research group needs to have a high "impact," which is measured according to the number of references, in order to receive assurance of its scientific prestige.

Over the past 20 years associates of the U.S. Institute for Scientific Information and other specialists, who work with the databases of this institute, have performed interesting research on the evaluation of the role of developing and industrially developed countries in the world scientific community. Recently Garfield presented the results of an analysis, which was made by a group of experts and shows the trends of the development of science in Japan.⁴ In the number of published scientific articles in 1973 Japan held 6th place in the world, the United States held first place, while the USSR held fourth place. In 1982 the United States continued to hold first place, the USSR moved to fifth place, while Japan moved to third place. The analysis of the SCI database shows the steady and impressive growth of Japanese science. For example, in 1978 Japan was in sixth place in the world in the number of authors of scientific articles, in 1982 it was in fifth place, while in 1986 it had already

moved up into third place. It is impossible here not to note that 95 percent of all the articles of Japanese authors, which are reflected in the SCI database, were published in English and they were cited twofold more often than publications in Japanese.

The data presented by Hungarian specialist D. Braun show that during the period of 1978-1980 Japan as compared with other countries increased its scientific productivity by more than twofold. The greatest surge was in such fields as physics and the life sciences, then follow chemistry and mathematics.

According to the testimony of C. Owen, who spent four years at the Tokyo branch of the U.S. National Science Foundation and now directs the department of information and analysis of international programs in Washington, the system of recognition and awards, which existed until recently in Japan, did not give scientists a stimulus for the prompt publication of results. Now the policy in this respect has changed, and researchers have entered the struggle for international prestige. This requires of the scientist not only the high quality of work and its presentation. He should be the first to rise to a new level and to publish his results in a prestigious journal. The basic stimulus of the contemporary Japanese scientist is to become a creator of new information and to increase the contribution to basic research. The next 15 years, in the opinion of Garfield, will show that Japanese scientists will become a force in science, which is shattering in impact.

It is interesting to compare the data on Soviet and Japanese science, which are cited in the mentioned work of Garfield. The cumulative data for the periods of 1973-1978 and 1978-1982 were examined. The total number of Soviet publications given the increase of the number of our journals, which are processed at the U.S. Institute for Scientific Information, had decreased by 1982 by 11 percent, the number of American publications increased by six percent, and the number of Japanese publications increased by 38 percent. The USSR in the number of publications during 1978-1982 held fifth place in the world, the United States held first place, and Japan held fourth place. In the citation frequency of works among the 15 most developed countries the United States holds 1st place, the USSR holds 11th place, while Japan holds fourth place. This fact, which testifies to the high citation frequency of Japanese works as compared with Soviet works (both Russian and Japanese are grouped with rare languages), correlates with the incomparably larger number of Japanese works which have been published in English.

It is also necessary to note that, according to the data of the U.S. Institute for Scientific Information, the effectiveness index and the influence factor of our journals are significantly lower than those of foreign journals (all the journals, which are processed at this institute, are

translated in full into English). However, a certain snobbery, which is displayed by American scientists with respect to the citation of works of Soviet colleagues, plays not the last role here.

And still it is rather interesting to cite several data which characterize the reaction of the world scientific community to scientific research in the USSR. Included among the 1,000 most frequently cited authors during the period of 1961-1975 were the following Soviet scientists: L.D. Landau—18,888 references (2nd place), V.L. Ginzburg—6,834 (66th place), A.N. Nesmeyanov—6,783 (68th place), A.A. Abrikosov—5,429 (109th place), Ya.B. Zeldovich—4,794 (152nd place), N.G. Basov—4,320 (202nd place).

Among the 1,000 most frequently cited works during 1961-1982 the authors were broken down by countries in the following manner: the United States—704, Great Britain—149, Japan—11, Israel—6, the USSR—4.

It is interesting that a work of Soviet physicist D.N. Zubarev, which was cited more than 2,000 times over 23 years and was reflected in "The Classics of Citation" (a permanent heading of CURRENT CONTENTS), was among the first 500 of these 1,000 articles. The English translation of this article appeared in the year of its publication. Half of the references were made to the original, while 390 were made to both versions.

It is necessary to note that all 500 articles—the citation champions—were published in 130 journals, moreover, 50 journals contained 83 percent of these articles. The journal USPEKHI FIZICHESKIKH NAUK was among the 130 journals. The breakdown of works by fields of knowledge is as follows: 75 percent—the life sciences (including biochemistry); 12 percent—physics; the remainder—chemistry.

Among the most frequently cited works on mathematics and computer technology, which were published from 1976 to 1980 (they were selected on computer from 210,000 works), are five articles of Soviet mathematicians and physicists:

1. V.Ye. Zakharov, A.V. Shabat;
2. A.M. Polyakov;
3. A.M. Polyakov;
4. A.A. Belavin, A.M. Polyakov, Yu.S. Tyapkin;
5. L.D. Faddeyev, V.N. Popov.

Included among the 250 most frequently cited authors during 1984 were L.D. Landau—he was cited 1,838 times, Ya.B. Zeldovich—730, V.Ye. Zakharov—453, and V.V. Korshak—451.

Unfortunately, until recently Soviet specialists in practice did not have an opportunity to work directly with the SCI databases. (The All-Union Scientific Research Institute of Applied Automated Systems is the only

organization, through which access to foreign data banks in remote access mode is carried out.) Therefore, let us once again use the data published by Garfield. During 1985-1989 A.A. Abrikosov, V.I. Goldanskiy, L.M. Brekhovskikh, V.Ye. Zakharov, and V.Ye. Vaskovskiy were among "the classics of citation." In all 3 Soviet works were included among the 104 (this threshold is established arbitrarily) works on physics published in 1985, which were most frequently cited during 1985-1986. Their authors are: Ye.S. Fradkin, A.A. Tseytlin; P.A. Kalugin, A.Yu. Kitayev, L.S. Levitov; A. Vilenkin. Two were published in foreign journals, one was published in *PISMA V ZHURNAL EKSPERIMENTALNOY I TEORETICHESKOY FIZIKI* (English edition).

Among the works on organic chemistry published in 1984, which were most frequently cited during 1984-1986, there are also three Soviet works, one of which was again published in *PISMA V ZHURNAL EKSPERIMENTALNOY I TEORETICHESKOY FIZIKI* and two were published in foreign journals. The authors of these works are: V.F. Karninskiy, T.G. Prokhorova, R.P. Shibayeva, Ye.B. Yakubskiy, V.P. Shibayev, N.A. Plate, M.R. Vasilevskiy, and M.R. Nenichuk.

I would like to direct attention to the following circumstance. About 15 years ago the U.S. Institute for Scientific Information began to publish "The Journal Citation Index." A number of parameters, which make it possible to estimate their information significance, are used in it. The effectiveness index, which is determined by the time, after which an article, which has been published in one journal or another, begins to be cited in others, and the influence factor, which characterizes the extent of the citation of a journal (the ratio of the number of references to publications of this journal during the past two years to the total number of its articles during the same period), are the most important ones. Among Soviet publications *ZHURNAL EKSPERIMENTALNOY I TEORETICHESKOY FIZIKI* and *PISMA V ZHURNAL EKSPERIMENTALNOY I TEORETICHESKOY FIZIKI* have the highest rank with respect to these indicators. The great information significance of these journals is confirmed by the fact that the most frequently cited Soviet articles have been published in them.

And, finally, on the list of the most frequently cited works on mathematics and physics, which were published in 1986, we encounter nine Soviet works, which were signed by a large number of authors, among whom are L.D. Faddeev, R.Z. Sagdeev, and A.M. Polyakov (who were repeatedly included among the most frequently cited Soviet scientists during the period of 1977-1978), B.V. Zubkov, V.B. Leonas, S.P. Mikheyev, A.Yu. Smirnov, V.A. Styazhkin, and tens of other names. All nine of these workers were written in joint authorship with foreign colleagues and were published in foreign scientific journals. Here it will be opportune to recall that Garfield in an article, which was published in

PRIRODA back in 1980, appealed to Soviet scientists to have their works published in English.

In addition to other reasons, the low citation frequency of Soviet publications is connected with the long holding of articles in the backlogs of unpublished materials of editorial boards, the frequent violation of the deadlines of the publication of journals, and the absence of scientific references in articles. It is necessary to raise the level of Soviet scientific journals to the international level. But at the same time it is necessary to eliminate the bureaucratic obstacles that are still preventing our scientists from having their works published in foreign journals. For the place of Soviet science in the world scientific community to no small extent also depends on this.

The time has come to return to that, with which this article began. The modest list of Soviet works, which enjoy world fame, still confirms the fact that citation indices can serve as a useful indicator in case of the financing of scientific research on a competitive basis. During the period of the keen campaign drive for deputy mandates a number of candidates, among whom were Zh.I. Alferov and V.L. Ginzburg, who are now already people's deputies, spoke about the need to use the citation index for evaluating the activity of the activity of scientific collectives. Ye.P. Velikhov, V.I. Goldanskiy, A.S. Spirin, and G.I. Marchuk repeatedly called for this when addressing general assemblies of the USSR Academy of Sciences. The acquisition by the Library for Natural Sciences of the USSR Academy of Sciences of the annual SCI files on optical disks, which make it possible to carry out computerized retrieval, is substantially simplifying this task.

Footnotes

1. J.A. King, *CURRENT CONTENTS*, No 14, 1989, pp 4-9.
2. Articles, which are cited a specific number of times, let us assume not less than 15, are selected at the first stage of the formation of the clusters. Then it is established which of them are cited together in different articles. If you link all the frequently cited articles by the ties of joint citation, it is possible to obtain groups of the most connected articles, or clusters, which show the basic directions of contemporary research and in aggregate form a kind of map of science.
3. E. Garfield, *CURRENT CONTENTS*, No 37, 1988, pp 3-5.
4. *Ibid.*, No 46, 1987, pp 3-9.

Financial Problems, Solutions at Ioffe Physical Technical Institute

907A0134A Leningrad LENINGRADSKAYA PRAVDA
in Russian 6 Dec 89 p 2

[Article by S. Samoylis under the rubric "Science: A Time of Changes": "Without Putting Off Until Tomorrow. At the Physical Technical Institute of the USSR Academy of Sciences They Established Their Own Economic Service"; first two paragraphs are LENINGRADSKAYA PRAVDA introduction]

[Text] A. A. Fursenko, deputy director for scientific work of the Physical Technical Institute imeni A. F. Ioffe of the USSR Academy of Sciences, G. V. Kalvarskiy, chief economist of the institute, and I were talking already for a second hour, when I asked: What all the same changed at the Physical Technical Institute after the establishment of the economic service?

"The question is understandable," A. A. Fursenko replied. "Indeed, everything, it would seem, remained as before, only there were several more economists at the institute. But in reality changes exist. And fundamental changes...."

This was a difficult time for the Physical Technical Institute. In July 1987 a new director—Academician Zh.I. Alferov—took charge of the institute. In another four months all the deputy directors for scientific work were also replaced. The institute needed new leaders, who could look in a different way at the many problems, including those that did not have, it would seem, a direct bearing on basic science. And first of all economic problems.

For many years the economy of academic science dragged out an unenviable existence. And this is not surprising. Economic problems worried few scientists. The research all the same is basic, money for a laboratory—whether or not the theme is promising—was allocated, no one required an immediate return.... Economists, in turn, did not have anything to do with science, for they did not participate, as a rule, in the making of any serious decisions. The accounting office, the planning division, and other traditional economic subdivisions were buried in a sea of administrative documents, but were oriented not toward the problems of the scientific research institute itself, but only toward "not allowing" financial infringements. It is not difficult to imagine in what a state the economy of the majority of institutes of the USSR Academy of Sciences was.

Thus, it was also necessary to establish economic order at the Physical Technical Institute. It was found, for example, that at the Physical Technical Institute neither more nor less than 43 people worked in excess of the manning table. That considerable arrears with respect to the wage fund existed. Finally, that the amount of the applications for financing, which were submitted by the

laboratories, exceeded by twofold the assets being allocated to the institute. And it would be possible to continue such examples.

"We made the decision to freeze the manning table and 'arrested' all accounts," A. A. Fursenko would later tell me. "In short, every week we banned something. I cannot say that this contributed to the popularity of the new administration. But it was necessary to solve the economic problems—this also made it incumbent to think about the establishment at the institute of a fundamentally new economic service."

It is clear that this task would not be accomplished in a single day. Therefore, first the Physical Technical Institute enlisted as an economic consultant S. V. Valdaytsev, head of a chair of Leningrad State University. The transfer to the Physical Technical Institute of experienced economists was the first concrete step on the establishment of the new service.

Candidate of Economic Sciences G.V. Kalvarskiy was one of those who transferred to the Physical Technical Institute. Not only the prestige of the leading academic institute, but also the novelty of the statement of the question attracted him.

"Until recently there were no economic regulations at the institute," G. V. Kalvarskiy relates. "I am talking about the situation, when science existed by itself and the economy existed by itself. It was very important to change the attitude toward the economy of the institute, toward the economy of science in general, not only on the part of the board of directors, but also on the part of scientists. To combine economic and scientific decisions, to organize the matter so that the economy would 'work' for science and vice versa—here, it seems, is the essence of the economic law, which our service should have also implemented...."

It is necessary to note: these tasks completely coincided with the general trends of development of academic science. By a decree of the USSR Council of Ministers academic institutions were changed over to the new conditions of financing and management. Here the economic methods of management in the system of the USSR Academy of Sciences were expanded significantly. The system of management of each academic institute was also restructured—on the basis of the development of the principles of internal cost accounting.

For example, the abandonment of planning according to the expenditure principle, the financing not of laboratories, but of themes and scientific schools, the dependence of the revenue of an institute on the volumes and importance of scientific themes...were stipulated in the decree. Knowing how several Leningrad institutes of the USSR Academy of Sciences became feverish in connection with the changeover to the new conditions, I was curious: How did the Physical Technical Institute feel in this situation?

"As a matter of fact, this was the first serious test for the new service," A.A. Fursenko says. "There were really enough problems, for example, with the determination of the percentage of the deductions for the fund for the remuneration of labor. A paradoxical situation formed, in which 'leisurely' working institutes of the same type as the Physical Technical Institute could deduct for this fund up to 28 kopecks per ruble. The Physical Technical Institute—the leader in its scientific directions in the country and in several directions in the world—could deduct only 18 kopecks. The economic service proposed its own, practicable version of a unified standard for a group of institutes of the same type. Later in Moscow, in the planning and finance administration, this standard was approved."

The solution of this problem is, in my opinion, a vivid example of the work of the economic service on the accomplishment of one of its main tasks. It is possible to formulate it as follows: the defense of the economic interests of the Physical Technical Institute—from the financing of programs to contracts—in superior and other instances. "The center always has some economic interests of its own," A.A. Fursenko noted. "It is very difficult, as a rule, to make them coincident with the interests of the institute. The present positive solution of the problem is entirely the service of our new service."

This is an important, but, I repeat, far from the only task of the economic service. The watching out for the interests of the Physical Technical Institute during work with other organizations, both state and cooperative, the drafting of various kinds of economic documents (I carefully familiarized myself, for example, with the temporary statute on the work of scientific subdivisions under the new conditions of financing and management), and, finally, the forecasting of the situation and the analysis of economic trends are also among them.

The economists also have much work within the walls of the Physical Technical Institute. First of all on the approval of the "economic law," about which G. V. Kalvarskiy spoke. This will make it possible, they told me, to correct to some degree the past economic mistakes and not to allow new ones. This law seemed like a

regular, by no means mandatory "innovation" to some people. And they were mistaken.

A year ago at the institute it was decided to carry out a reduction of staffs. The step was, on the one hand, forced and, on the other, strictly economically substantiated. At a meeting of the scientific council it was announced to the managers of the subdivisions: the reduction would make it possible to increase the wage of the most skilled associates by 30-40 percent. But several divisions never carried out the reduction and remained—in conformity with the "economic law"—without raises. Private "summit" talks also did not help. Thus the formation, figuratively speaking, of the law-governed economic system took place.

"Its most important component is economic *glasnost*," A. A. Fursenko noted. "At the beginning of the year we reported all the economic computations at a meeting of the scientific council and at a conference of the labor collective. After the adoption of the corresponding decisions all the computations become a law, which is mandatory both for the scientific subdivisions and for the board of directors...."

Of course, it is difficult to tell simultaneously about all the directions of work of the economic service that was established at the Physical Technical Institute. Each of them, in my opinion, requires a separate detailed analysis. But it is necessary, the interest, which colleagues from other, and not only Leningrad, institutes of the USSR Academy of Sciences are displaying in the new service, testifies to this. Should one, perhaps, share the already gained experience simultaneously with everyone who is interested in establishing similar services?

Why not, for example, hold a seminar on the basis of the Leningrad Scientific Center of the USSR Academy of Sciences, at which one would tell about the formation of the economic service, the most important directions of its work, and the prospects? Perhaps, it is also expedient to include this question on the agenda of one of the meetings of the presidium of the Leningrad Scientific Center. As practical experience shows, economic problems are becoming today the most important issue for practically every academic institute. And one must not put this issue off until tomorrow.

Council of Ministers Specialist on S&T 'Brain Drain'

907A0136A Moscow PRAVITELSTVENNYY VESTNIK
in Russian No 5 (31), Jan 90 pp 10-11

[Article by A. Karavayev, chief specialist of the Scientific and Technical Progress Department of the Administration of Affairs of the USSR Council of Ministers: "The 'Brain Drain' Can Bleed Soviet Science White. This, It Would Seem, Typically Western Phenomenon Is Also Becoming Characteristic of Our Country. A Dangerous Trend"]

[Text] "The export of the intellectual potential from the USSR? Is it not a far-fetched problem?" Some reader, who has learned thoroughly that we export abroad, for the most part, raw materials, will ask, but the myth that our country leads in many scientific directions, has also departed this life. What will you reply here? Of course, domestic science has fallen a little behind in something, but still it—especially basic science—continues to enjoy deserved respect in the world scientific community.

Last year the members of the USSR Academy of Sciences we asked to evaluate the level of Soviet research in the priority directions. The survey showed that in approximately 40 percent of these scientific fields we either lead or are at the level of world achievements.

Of course, it would be possible to treat such a high self-evaluation with a certain grain of skepticism, if it were not corroborated by...the opinions of western experts. They believe that the Soviet Union has "high brain power," an enormous intellectual potential.

It has been known for a long time that the firms of leading countries carry out the culling of talented scientists in all corners of the world. Our country also did not become an exception. Until recently in our country it was quite difficult for a worker of intellectual labor to go abroad for a long period. But then many restrictions were eliminated, and immediately the flow of Soviet citizens leaving for other countries increased. With the passage of the new Law on Departure From the USSR and Entry Into the USSR this flow will hardly decrease and most likely will increase even more. And the "brain drain" problem will join the category of state problems.

After all, in developed countries the need for new ideas is constantly increasing—hence the demand for skilled personnel is also growing. The aspiration of capitalist countries to muffle debates about the "brain drain" and to veil the true dimensions and mechanism of this process is traced not by chance from the late 1970's. For example, the United States—the basic consumer of specialists from "third world" countries—since 1980 has not published information on their immigration. But meanwhile, to judge from some data, in the 1970's and 1980's the United States satisfied half of the needs for mathematicians by means of emigre scientists, primarily from the USSR. At the same time both the United States and the other leading capitalist powers are ignoring the

discussion of the "brain drain" problem at the United Nations and in UNCTAD—the United Nations Conference on Trade and Development.

Everywhere in the world the need for new ideas and promising technologies is increasing more and more. This is a powerful stimulus for the conducting of basic research and the attraction of gifted scientists on the side. It is possible to say that an international market of the scientific product, technical ideas, and technologies already exists. For the present we are still taking a weak part in it. But we are already beginning to feel its influence.

Under the influence of these processes the demand for skilled personnel is steadily increasing—the scale of the "brain drain" is also expanding accordingly. It is already possible to clearly define three flows of the migration of scientists and specialists in our country. One of them is controllable, when our graduate students, undergraduates, and scientific personnel go for practical studies and the sharing of know-how, as a rule, on a mutual noncurrency basis. The second is semicontrollable, when a Soviet scientist is invited to work for some time, for example, a year, at a foreign firm, laboratory, or university, of course, with compensation. In this case the institute registers him for a long-term business trip and reserves his position with partial pay in Soviet rubles. And, finally, the third one is when they leave on their own initiative, perhaps, forever.

If we examine the second, semicontrollable flow, at several academic institutes they are already experiencing a shortage of scientific associates, inasmuch as a portion of them are working abroad on personal invitations. The number of researchers, who leave in this manner for long periods (from three months to a year with the opportunity to extend the term of stay), last year as compared with the year before increased by several fold (for example, to the United States—by fivefold). Moreover, the bulk falls to the United States and the FRG. Unfortunately, scientists, who work in the field of solid-state physics and nuclear physics, applied mathematics, biotechnology and molecular biology, and chemistry, that is, scientists of the leading directions of knowledge, scientists, a shortage of whom is also being experienced in our country, are going.

In short, our scientific personnel are in great demand in these fields, hence, domestic science is not that bad. There are still talented people in our homeland! And we should think about how we ourselves are to make the maximum use of these talented people and how we are to find effective use for them in our country, without dispersing this national property. How to organize the matter so that a scientist would go abroad for the sharing of know-how and practical studies, in order to halt the "brain drain," having transformed this process into a two-way street, which is advantageous for the country, the researcher himself, and the entire world scientific community.

Incidentally, in the CEMA member countries they are experiencing the urgency of this problem not for the first year. According to the calculations of experts, a catastrophic shortage of specialists of a number of fields of science and technology awaits Poland in five to seven years. Last year alone 12 percent of all scientists and specialists—one in eight—left Hungary for work abroad, primarily in the United States and the FRG. The worsening of working conditions, the inadequate material supply of scientists and specialists with a higher education, and the decrease of assistance to science on the part of the state are named as the basic reasons. Due to the rapid outflow of scientific personnel a large shortage of them is already appearing in several specialized fields.

For the present the search for effective barriers in the way of the "brain drain" is not yielding appreciable results. The times of administrative bans have receded into the past, but in order to actuate a different mechanism, it is necessary first to understand what attracts people to the West. The first thing, which lies on the surface, is the higher standard of living and better material conditions. But not only this—it would be a mistake to accuse scientists one and all of pursuing "an easy dollar." For the genuine researcher precisely benefits of this sort are not the primary thing. The more extensive material and technical possibilities for conducting research for the implementation of his scientific ideas, the possibility of the free and prompt sharing of opinions and ideas with colleagues throughout the world, the rapid introduction of results, the recognition of his work, and a smaller degree of the politicization of science attract him. One of the essential factors is competition in scientific research, not such large-scale "monopolization" in science, and the opportunity to carve a path for a talented person outside clans and groups.

On this basis it is also possible to outline the steps which will make it possible not to squander our intellectual potential. In the opinion of experts of the International Scientific Research Institute of Problems of Management, the main efforts should be focused on the following basic directions. First, it is necessary to create the conditions for participation in scientific operations on a competitive basis, in particular, to hold more often competitions of anonymous projects. Second, it is necessary to organize large world-level scientific centers, which are capable of attracting leading scientists. And a base for them exists in the country. Take if only such ones as the Moscow Physics Institute imeni P.N. Lebedev and the Leningrad Physical Technical Institute imeni A.F. Ioffe of the USSR Academy of Sciences, the International Mathematics Institute imeni Leonard Euler. These and other well-known institutions at times are also equipped no worse than foreign institutions, but for the present because of our poverty or timidity we cannot invite talented young people. And we are not trying very hard to find them, as foreign selectors from science are doing. But we cannot pay the brightly shining "stars" of science for their labor as they pay them

"there" or create if only similar conditions as "there." But such times will come, it is necessary already today to actively prepare for them and thereby to bring them closer.

Third, it is already time to change over to the system of the hiring of specialists with the use of individual contracts—both within the country and in case of contracts with foreign firms. Let us take if only the experience of Hungary (this time positive experience): There skilled specialists can conclude one-year contracts with foreign companies. Having done the work, they return to their homeland, moreover, most often they do not sever contacts with foreign partners and establish small joint ventures. Thus, the "export of brains" is being reduced to a minimum and is even being accompanied by the import of technologies.

A scientist, who has concluded a contract with an institute, will be protected socially and will not go on invitation, without having considered soundly the consequences of breaking such an agreement: After all, it will probably entail a large material loss. Contracts will help to regulate the interrelations of the researcher with society through agreements with scientific institutions, on the basis of which the scientist performs his work. It is necessary to legalize the interrelations of the scientist and the state and to balance their interest in foreign contracts.

And, finally, it is necessary to improve substantially the material reward of scientific and technical personnel. I will repeat—this factor is not primary for genuine scientists, but one must also not ignore it.

During the Stalinist and stagnation times they checked the departure of scientists, as they were able, by administrative command steps. Today the barriers have been eliminated. But...we have turned out not to be prepared to control the process of the bleeding of our science white. Delay here is equivalent to "strategic suicide"—that is how Academician S. Shatalin characterized this problem at the meeting of the presidium of the USSR Academy of Sciences in January of this year. Is it a hyperbole? Perhaps. But you will not deny the wisdom, farsightedness, and topicality of this thought of the scientist.

S&T Research Institute Support of MVD Discussed

907A0135A Moscow *POISK* in Russian
No 4 (39), 25-31 Jan 90 p 8

[Article by Dmitriy Mysyakov under the rubric "Science Against Crime": "Money for the Investigator"; first paragraph is *POISK* introduction]

[Text] All we had to do was to publish the first note under the new rubric "Science Against Crime" (*POISK*, No 37), and a barrage of telephone calls rained down on the editorial office. As it turned out, many scientific institutions are willing to extend a helping hand to law

enforcement organs that are in distress. The callers offered their services in electronics, radio engineering, programming.... Everyone had the same request for POISK: put us in touch with the client.

We, of course, were glad of the calls: at last the ice has broken! For so much has already been heard and read about the antiquated level of the machine-worker ratio of the MVD [Ministry of Internal Affairs], and the minister himself at the Second Congress of USSR People's Deputies spoke from the rostrum about the same thing. But look here: there are lots of proposals, it is necessary only to select the most interesting ones.

We decided to share our joy first of all with those, who officially are directly engaged in the scientific and technical support of our militia, and left for the Scientific Research Institute of Special Equipment of the USSR MVD. However, within the walls of this institution they greeted us, though politely, somewhat coolly. Yu. Silantyev, deputy chief of the scientific research institute, did not begin to conceal the fact that he personally did not like that first note in POISK. Precisely for what? For the fact, for example, that in it much was written about the American kit for the identification of narcotics and not a word was written about our, Soviet kit. But such an outfit exists and is being used quite successfully.

Here it is necessary to explain that back before the visit to the scientific research institute we had an opportunity to familiarize ourselves with both kits. To familiarize ourselves—and to compare them. Obviously, it is unnecessary to specify in favor of which one the comparison was. And we considered it possible to tactfully pass over in silence the product of the domestic enterprise with the mysterious name "Pilot Plant of the VNIIKhTLS [expansion unknown]." Now we understand: in vain did we not write it. It was necessary to do this if only because nearly all the problems, which are typical and usual for our science and constantly emerge on the way from what has been contemplated to what has been produced, were reflected as in a mirror in the story of the development of the domestic kit. At the Scientific Research Institute of Special Equipment V. Golov, manager of the group of special chemical agents, related to us this sad story. When they took up the outfit in earnest here, it turned out: the means, which was proposed by western specialists, is absolutely no good for us. Polymer film, which is resistant to breaks, is used in their kit. But we do not have such film. They have thin-section vials. But we also do not have such vials. There is likewise no equipment for the measuring out of preparations and color printing on polymers and even much more, which they used in the United States. As a result V. Golov and his comrades were forced to devise something completely new. But when they had all the same devised it, having managed to find a substitute for all the American parts, they were confronted with the next obstacle—none of the manufacturers wanted to produce these outfits. It is quite understandable: for them this is only extra trouble and a headache. It is far more profitable to produce some medicine, which requires fewer efforts and, moreover, is

counted toward the plan on consumer goods (TNP), which is mandatory for fulfillment. Now if the order of the MVD were included in a state order, in this very plan on consumer goods, which is backed with resources, or the client were to pay at contract prices, then this would be a completely different matter.

What is happening as a result? The entire institute is working without having any guarantees that the fruits of its labors will ever be used properly. If industry becomes restive, a development, however important and necessary it is, might simply remain on the "shelf." And all because there is no state order for it. But pardon me, are the numerous decrees on stepping up the fight against crime really not in their essence a most real state order?

This also fully applies to the interrelations between the law enforcement system and "big" academic science. It turns out that it is the height of naivete to rejoice over the suggestions from scientists, which were received by POISK, as we did. From the explanations of Yu. Silantyev, who is already familiar to the readers, it followed with all obviousness: there were also plenty of such initiatives before. They called and are calling the Scientific Research Institute of Special Equipment and are sending letters. We have, they say, the most interesting ideas, do you not want them? But the whole point is that the desire is often enormous, but the possibilities are always minimal. Ideas, as is known, cost money, and considerable money. Their implementation is even more expensive. The laboratories and institutes, which have been plunged into cost accounting, not to mention the centers of scientific and technical creativity of youth and ones similar to them, today are preoccupied with commerce and are by no means striving for philanthropy on behalf of the MVD. And that is why they are demanding quite reasonably payment for their labor in its interests.

For example, the Scientific Research Institute of Special Equipment planned to come to an agreement with one of the Leningrad scientific centers on the development of equipment for the detection of narcotics. And they seemed to have reached an agreement on everything, but when the conversation turned to money, the Leningraders asked 4 million rubles for the "artificial nose." Moreover, only for the scientific research work, not counting the planning and design work. But what are 4 million rubles? This is exactly a third of the usual annual budget of the Scientific Research Institute of Special Equipment. It is clear that to give them up for one theme would mean to strip all the others. They had to abandon such a tempting project. Incidentally, if we were now to begin to recall a' l similar cases, we would end up with an entire volume of such "recollections about what was not realized."

No, the representatives of the MVD are not accusing their partners of striving to make a fortune on their difficulties (although such a thing is also encountered at times). They usually ask a fair price. But given a 12 million ruble budget how will you pay for jobs that cost many fold more? It remains only to shorten the list of

orders and to give up reluctantly the most necessary one. This year, it is true, the Scientific Research Institute of Special Equipment "grew rich"—it received an additional 5 million rubles. But this, too, is a drop in the ocean.

We all remember with what difficulty and with what gritting of teeth the USSR Supreme Soviet approved the budget of the country for 1990. Yes, the situation with

finances is difficult. But there is the word that is now very fashionable—"priority." It is in the determination of priorities that we, in spite of all the talk about this, often still make mistakes. We will probably understand one day that we made mistakes during the hectic 1980's by economizing on the fight against crime. It, as is known, is growing and getting stronger in our country, approaching a critical point. Is it still a long way to it? Do we have time to change our mind?

Marchuk Comments on State of Kazakh Academy of Sciences

907A0110A Alma-Ata KAZAKHSTANSKAYA PRAVDA
in Russian 10 Dec 89 p 2

[Report on speech by President of the USSR Academy of Sciences G. I. Marchuk at a field session of the General Assembly of the Kazakh SSR Academy of Sciences in Guryev (KAZTAG): "Include Science in the Unified System of Development"; date not given; first paragraph is KAZAKHSTANSKAYA PRAVDA introduction]

[Text] As has already been reported in the press, President of the USSR Academy of Sciences G.I. Marchuk addressed the field session of the General Assembly of the republic Academy of Sciences, which was held in Guryev.

At this session, in which, in essence, the entire applied science aktiv of the republic is taking part, the most profound processes and problems, with which perestroika has faced you, are being examined, he noted. The amount of simply invaluable information on various aspects and positive trends, which has been presented in systematized form, creates a great impression. All this is extremely important in order to formulate completely the program of the social and economic development of the republic.

Today a fundamental issue—the determination of the means of the combined solution of the problems that are connected with the optimization of the productive forces of Kazakhstan—is being discussed. This, undoubtedly, will also occur in other republics. Until now such a most important problem, which it was not possible to solve in accordance with the canons of the times of stagnation, faced everyone—this is the uniting of the efforts of different sectors and departments for the obtaining of a final product.

The saving of resources and the careful use of everything that nature gives are one of the main conditions of economic development. For how much was lost because in our country every sector, department, and enterprise attempted to implement some one scientific and technical direction for the obtaining of basic resources and the achievement of local scientific and social results.

Now, when the republics are beginning to switch to economic independence and self-financing, the opportunity is appearing for the first time at their own discretion to make up the plan and to coordinate the activity of sectors, departments, and enterprises so as to obtain the optimum final product.

Then the raw material sectors will also become profitable—provided the final product, in which the bulk of the value and profit is concentrated, is obtained locally and provided this profit is properly distributed among all the preceding members of the technological chain. The logic of economic laws under the integration conditions of our developing state lies in this.

Opinions, which testify to the awareness of this process, were clearly heard in the reports of Chairman of the Kazakh SSR Council of Ministers U.K. Karamanov and Chairman of the Republic State Planning Committee K.A. Abdullayev. During the 13th Five-Year Plan Kazakhstan will be the first among the republics to enter a closed cycle of the thorough processing of raw materials and the obtaining of a final product. The comprehensive development of the economy and the uniting of efforts for the comprehensive efficient use of minerals, in which it is so rich, will thereby be ensured.

Then the president of the USSR Academy of Sciences dwelt on questions of ecology. This, in his opinion, is a problem of exceptional importance. The same principle shows in the fact that the environment has been destroyed and that steps have to be taken already while it is in a state of crisis: Each ministry and department accomplishes its own tasks, without being concerned about the overall ecological balance. A new direction, which stems from perestroika and the radical reform of the economy, is now emerging. Everything is being brought into focus in the accomplishment of the common goal, the ecological component is becoming one of the decisive elements of the system. Of course, expenditures and a plan are needed for the improvement of ecology, it is necessary to restore the nature being disturbed starting with the first day of the implementation of a project. Everything that has been destroyed should be brought back to life.

In general, in planning the pyramid has been turned upside down. How was it done earlier? It was calculated how much manganese, petroleum, and other resources were needed, and then they looked at who would provide how much for society and for man. Planning tore production away from man.

Perestroika is returning the pyramid to its proper position. At its top should be man, society, and its needs. While production is called upon to meet them. This is the outlet to the normal, human path of planning, which in the final analysis will make it possible to approach the optimum development of society. Moreover, the program of social development and the infrastructure, which support the entire system, are being made the cornerstone.

In connection with this the speaker stressed two ecological problems that were touched upon at the session. The first is the problem of water. In the Western Kazakhstan Region water is such an important resources that only petroleum can be equal to it.

It is necessary to put this problem under special control. In Kazakhstan there are already well-developed systems and modules, which make it possible, by using electrochemical transformations, to remove all kinds of salts from water. This is a great success of institutes of the Academy of Sciences. It is correct that a green light will be given to the implementation of the idea and that it is planned to shift from the production of tens of units to

tens of thousands. The problem of local reclaiming and the obtaining of pure water will thereby be completely solved. And this is of not only social, but also political importance.

But where is one to get the power for the purification of water? It is a good thing that understanding already exists: The use of wind power provides unlimited possibilities. The entire world is switching to windmills: They can operate wherever you like, and this is extremely important. It is also impossible not to agree that the use of other nontraditional sources of power—solar and hydrogen power engineering—merits every type of development.

The question concerning the redistribution of water resources and the use of waters of the Caspian Sea for irrigation also requires in-depth scientific study and economic and ecological calculations. We are prepared to help in this, but a command decision is impossible here. It is necessary to convince the country and the people of the republic of what is expedient and what is not.

G.I. Marchuk cited an impressive example of the successful restoration of the environment in Turkmenistan. Having initially established a biological preserve, a real saxaul forest, which became an oasis, was grown here, in the region of Nebit-Dag, on the sands of the Kara-Kumy. A stabilized zone emerged on tens and in places on hundreds of kilometers where there had been sands. UNESCO proposed to organize in this part of Nebit-Dag the International School for the Training of Specialists in Desert Recreation, and now it is operating splendidly. Students of this school are working throughout the world. Among the large number of problems the Turkmen Academy singled out the priorities and found the direction which made a contribution to world science. Kazakhstan also needs to choose such directions. What are they?

This is completely wastefree production based on the working of the most valuable minerals, which do not exist in such abundance in any republic of the Soviet Union. Hence, too, the main content of the work, including of the Academy of Sciences of Kazakhstan. Chemistry, the chemistry of petroleums, the chemistry of associated materials—all this will be made a part of the new life and will give the republic a consumer who will use this. In the opening speech of Academy President U.M. Sultangazin and the reports precisely these directions were spoken about as the main ones.

Then the speaker touched upon other interconnecting problems. It was correctly stated that it is necessary to go from plant laboratories to institutes of the academy. Moreover, it is necessary to continue this path to sectorial science, in order to complete the cycle. How is one to see to it that science would reach the most fundamental, key economic problems? This is difficult.

At one time voluntaristic decisions, which reflected the administrative command method, did it much harm. In

1962 institutes of the technical type, as well as institutes connected with soil science and institutes of other most important directions were taken from the USSR Academy of Sciences. They were transferred to the sectors of the national economy and then became average sectorial institutes. But now some people are saying: "Where is our Academy of Sciences? Why is it not connected with industry?"

Such approaches have also been observed in Kazakhstan. Very good geological and power engineering institutes, which were also transferred to sectors and ceased to produce the highest product of the basic direction, on which the progress of technology depends, existed here. It is necessary to prepare the soil to restore all this.

It might be advisable to involve all the institutes in the development of a unified complex. How is this to be done? It seems that it is better to take the follow path: State orders of, let us assume, the republic level are needed. If we choose about 15 such directions, which it would be possible to bring up to an end result, to a final product, and, having socialized everything, to obtain a final impact, this might become the real integration of basic science and production. It also does not harm to involve higher educational institutions here. I am convinced that the next five-year plan will become a five-year plan of state programs. The coordination of the major lines will make it possible to join the intellectual scientific product with the ecological product. In short, it is necessary to obtain an integral system, which would make science capable of yielding the largest impact.

We are on the threshold of the 13th Five-Year Plan. Therefore, it is important already now to consider well the formulation of major programs, which will make it possible to look at the future, and then also to organize state orders. Then everyone will also sense how great a force the Academy of Sciences is. For there will be a specific client, there will be a claimed science. Today, unfortunately, for the present it is for the most part unclaimed.

It is also impossible to ignore the following fact: Some comrades say that there is republic science, there is, say, Guryev science, Moscow science, Alma-Ata science.... There are no such sciences. There are basic and applied science. Some regional programs and problems or others exist. But every institute, let us assume, an academic institute, wherever it is, should strive in some direction or directions of its to attain the world level, while performing the role of a component of our common system of academic science.

It seems that Soviet science now has such possibilities. They have appeared only in recent times owing to the fact that the paths of motion of the national economy of each republic separately and the entire country as a whole have been evaluated in a new way. These paths are also already visible in science. We can specify some main priorities or others even when formulating the plans of

the 13th Five-Year Plan and when processing, in particular, the data of this general assembly.

Integrated research is needed, especially in Western Kazakhstan; it is necessary to move more resolutely away from single problems. And here one must not reinvent the bicycle. The only way out of the now unenviable position is cooperation. People should be invited to the region, a workers' conference should be organized, and a new level of work should be attained. While, if necessary, we will teach specialists at any other place, where more suitable conditions exist for this. Thus, we will save time, which is so precious for all of us.

There are many addresses for seeking partners in cooperation. Take, for example, petrochemical problems. Siberians have gained much experience in this sphere. Their catalysts work very actively in the deep refining of petroleum with a sufficiently high economic effectiveness. One would like to know: Why not enlist scientists from Siberia in joint research with Kazakhstan colleagues?

Or say, in the western part of Kazakhstan there is a very large amount of sulfurous gas and petroleum that is peculiar in its composition. For a long time we did not understand why the FRG was buying from us such crude petroleum and gas in natural form. It turns out that they pass this raw material through units, separate nearly all the components, and thereby completely recover the expenditures. So that, strictly speaking, the petroleum and gas are being delivered to them practically free of charge. Why do we not take all this wealth ourselves? Here, too, one simply cannot do without academic basic research.

I also want to say a few words about the development of the Kazakh SSR Academy of Sciences. I am experiencing great satisfaction that such great importance is being attached to it during the period of perestroika, democratization, and glasnost. The election to the Academy of Sciences was recently held, 12 academicians and 39 corresponding members were elected. A real foundation was laid for the formation of the Karaganda Scientific Center. The question of the advisability of establishing an academic center in Western Kazakhstan was raised here, at the session. While this means that the efficiency of work should also increase constantly. And there is no doubt that Kazakhstan scientists will be equal to the demands that are being made on them.

At the same time I would like, comrades, to caution you. There are attempts in several republics to reckon: Since there is their own Academy of Sciences, let it develop and work on regional problems, while all else for them is not the main, they say, affair of the union academy. If we take such a path, an end of republic academic science—applied and other—will come, and it will come already in the next few years. For other collectives in their scientific research in this time will get far ahead. In other words, such institutes will not be first from the point of

view of scientific ideas and will not be as needed by the national economy as they were previously.

In changing over to cost accounting we are pursuing the following policy: It is necessary to retain everything that the state has given in a centralized manner for the development of basic research, while the republics should finance regional programs. This will help to ensure the appropriate level in mathematics, physics, chemistry, general basic problems of the social sciences, culture, and so on. Then there will be the complete certainty that on the basis of basic science the applied sciences will begin to be developed rapidly in the interests of the republic. This is the only correct course. If we cut off a part of the basic research and allocations, that is the end of the Academy of Sciences, in about five years it will cease altogether to exist.

I would like to say that very interesting questions were raised in the reports on the development of Guryev Oblast. I believe that these suggestions were very specific and each of them can help to find such a solution, which will be extremely important for the entire republic and for the entire country. I completely agree that the brines of Mangyshlak are a problem, with which it is necessary to deal, it is a fundamental problem. It is necessary by means of membrane and other methods and technologies to reclaim them to such a fraction, which would be completely safe for the environment and the Caspian Sea in particular.

Or take, for example, another problem, which it is necessary to pose for the Academy of Sciences: the working of the exceptionally abundant local bitumen deposits. In our country, incidentally, bitumen matters are being worked on actively. Everyone must gather at a "round table" and look at what it is possible to use here, in the western part of Kazakhstan, and to develop as applied to local conditions.

Having touched upon the question of a free economic zone, the president of the USSR Academy of Sciences expressed the opinion that here a government decision is needed, proof of its expediency, as well as of the expediency of the laying of the Volga-Ural canal is needed. Although they were posed logically, they require in-depth additional analysis.

USSR Minister of Geology G.A. Gorielyants is attending the session. We should talk with him about many problems. If we are to leave an impression here for a long time, it is necessary to know thoroughly the structure of the region and its prospects. And much will depend on the position of the republic.

With respect to basic problems Kazakhstan has already found its place in the world system of the scientific distribution of labor. The question of the possible organization in Kazakhstan of a testing ground for the study of extensive atmospheric cosmic ray showers has been examined for a year with the most prominent foreign physicists. It was proposed to establish the largest station in the world, which may lead to such discoveries which it

is now even difficult to imagine. Everything was agreed on, the money is available, they had found a site. Physicists of the entire world are inviting us to work together and are prepared to make equipment and instruments available. But recently it became known that biologists of the republic object: This is the zone of a preserve, while it is necessary to place sensors at half-kilometer intervals. It is possible to understand the biologists. But is it really impossible to find another site? It would be unforgivable to miss such opportunities.

Academician Ye.V. Gvozdev also spoke here about ecological problems. The sorest spot in the republic, apparently, is the Ural River, because the Ural is a water artery, fishing, reclamation, and much more. At the cost of lengthy efforts the USSR Academy of Sciences saw to it that a decision on the ecological restoration of the Volga River basin is now being made. Perhaps, it is also necessary to raise the question of the Ural River basin. It is necessary to commission the Academy of Sciences of Kazakhstan together with all departments to submit a substantiation and to provide a truthful picture of everything that is happening here. And if required, the USSR Supreme Soviet, I am certain, will also support the republic.

Much was said about the incomplete processing of raw materials. They, according to incomplete data, amount every year to 1.5 billion rubles. If these assets are converted into apartment houses, it is possible to build a new city of Guryev. This is what the untapped reserves, which we now call "the incomplete processing of raw materials," are. Resource conservation and the thorough processing of raw materials are a central program together with ecological research.

N.A. Nazarbayev and I have spoken more than once about these problems, and it seems that he fully supports all this. Your leaders are capable of carrying out perestroika efficiently.

There are many problems that have been raised at the session, G.I. Marchuk said in conclusion. They should be generalized in the document, which will be prepared in accordance with its results, and be carefully examined in the presidium of the USSR Academy of Sciences.

Belorussian Academy of Sciences Elections Discussed

907A0115A Minsk SOVETSKAYA BELORUSSIYA in Russian 31 Dec 89 p 5

[Interview with Vice President of the Belorussian SSR Academy of Sciences Aleksandr Vasilievich Stepanenko, USSR People's Deputy, by SOVETSKAYA BELORUSSIYA correspondent V. Bibikov, under the rubric "A Competent Subject of an Interview"; "Is the Choice Justified?"; date and place not given; first paragraph is SOVETSKAYA BELORUSSIYA introduction]

[Text] As has already been reported, by a decision of the general assembly of the Belorussian Academy of Sciences

the "highest echelon" of the scientific intelligentsia of our republic was reinforced with four academicians and 29 corresponding members of the Belorussian SSR Academy of Sciences. Who are these people and are they actually the best of those, whose names were placed on the ballots—such is the theme of the conversation of a SOVETSKAYA BELORUSSIYA correspondent with Vice President of the Belorussian Academy of Sciences and USSR People's Deputy A.V. Stepanenko:

SOVETSKAYA BELORUSSIYA: Aleksandr Vasilievich, among the people perestroika has awakened a keen interest in who is personally responsible for the making of some decisions or others, including scientific and technical decisions. The latter circumstance has increased the attention to and the demands on the personality of those who are on the scientific Mount Olympus. Did these changes in public sentiment affect the election recently held at the Belorussian SSR Academy of Sciences?

A. V. Stepanenko: Of course, changes have occurred. This election was the first after the leadership of our academy was changed and after the election of the directors of institutes and chiefs of design and technological bureaus with a pilot works and of heads of laboratories was held. So that the reinforcement of the ranks of academicians and corresponding members was conceived as a continuation of the policy of democratization in personnel work among scientists. What specifically was done on this level? We began by gathering a kind of "data bank" on all Belorussian researchers who could if only to some degree aspire to the lofty title. There turned out to be about 1,500 such people. Moreover we tried to represent as broadly as possible VUZ [higher educational institution] science, collectives of sectorial scientists, as well as production. Fivefold more candidates than there were places were allowed to enter the election directly in the announced specialties. The Belorussian Academy of Sciences had not yet known such great competition.

The democratization of scientific organizational activity also appeared in the specification of the scientific directions, for which vacancies are announced. The question is very important, what branch of science will be developed in the next few years and even decades depends on it. The Presidium of the Belorussian SSR Academy of Sciences addressed to academicians the suggestion to voice their opinions in this regard. Many named specialties, which are far from the sphere of their scientific activity, but have great social repercussion. This testifies to the unbiased nature of the expressed opinions. Vacancies in the specialties "Radiobiology," "Information Science," "Robotics and Flexible Computerized Manufacturing Systems," and a number of others, which reflect the most promising directions of science and technology, appeared in this way. Here the needs of the scientific and technical complex of our republic, in which, as is known, machine building, chemistry, and

electronic engineering are playing a leading role, and the prospect of the changeover of Belorussia to self-financing were taken into account.

And, finally, it is impossible not to note the significantly more democratic nature of the very atmosphere of the held election. I state quite responsibly that no attempts were made "from above" to influence the Presidium of the Belorussian SSR Academy of Sciences. The information on the candidates was published in advance. Each of them was given the opportunity to say the most important thing about their work during the discussion of the candidates at the institutes and departments of the academy. Indeed, this was a kind of scientific tournament, but it took place in a gentlemanly manner. There were practically no attempts to spoil each other's reputation publicly or by means of planted letters, anonymous letters, and so on.

SOVETSKAYA BELORUSSIYA: What is the collective image of the regular reinforcement of our scientific Mount Olympus?

A. V. Stepanenko: This is no longer by any means an elderly researcher, who has behind him a serious contribution to the development of science or technology. The question of the increase of the age of members of the academy was particularly urgent at the Belorussian SSR Academy of Sciences. The average age of academicians was 68, while that of corresponding members was 63. After the election it decreased, respectively, to 63 and 58. Well, the very names of those newly elected testifies that this was not simply the pursuit of good-looking statistics. M.S. Vysotskiy, chief designer of the BelavtoMAZ Production Association, for example, hardly needs additional recommendation. The conceptually new model of a highway freight trailer truck, the Perestroyka, which was recently developed under his supervision, has received many flattering reviews. This became possible to no small degree owing to the fact that Mikhail Sergeyevich is conducting fruitful scientific research, the results of which were also implemented in the new vehicle. His election as an academician of the Belorussian SSR Academy of Sciences seems entirely natural against this background.

Many other scientists, who went up the hierarchical steps, are also authoritative among the scientific and technical community.

SOVETSKAYA BELORUSSIYA: Previously the academy was often reproached with the fact that among its members there were too many directors and other powers that be to the detriment of those who directly "do science." Here among those elected this time about a third are directors and there is even one minister....

A. V. Stepanenko: Among those elected there actually are quite a number of directors, but this does not mean that the executive chair, which they hold, had an influence. The criterion was the same for everyone: the weightiness of their store of scientific knowledge and lofty personal qualities. Such scientists as O.G. Martynenko and V.M.

Artemyev are well known first of all as prominent specialists, respectively in thermal physics and robotics, and then as managers. Owing precisely to the former circumstance they, like many others, also became directors, incidentally, as a result of democratic elections. Is it worth being amazed that the scientists named above were elected to the Academy of Sciences? On the other hand, many directors were rejected. For example, M.I. Strelyuk, prorector for scientific work of the Belorussian Polytechnical Institute, was in "company" with the director of an institute and a number of other strong contenders, but preference was given to him. There are many similar cases.

SOVETSKAYA BELORUSSIYA: The question of how objective the election of academicians and corresponding members is, also upsets many people for another reason. It is a matter of the objectivity of collective opinion itself. It has happened more than once that they have "slated" scientists, whose contribution to the development of science is indisputable. Suffice it to give the names of biologist Shlyk and philosopher Stepin. In spite of defeat within the walls of our academy, they were subsequently elected corresponding members of the USSR Academy of Sciences. There is no need to expatiate on the losses, which both specific scientists and Belorussian science as a whole have incurred. And this time the author of two scientific discoveries, the founder of a direction of scientific research in the field of nuclear physics, which is new in Belorussia, as well as a scientist, whose works in the field of the synthesis of superhard materials in many respect determine the world level, remained "overboard." Is this sad story not being repeated?

A. V. Stepanenko: I cannot completely deny the influence of the clan interests of one or another group of scientists, but such a factor has an effect in any matter. The main thing, I think, lies in something else. Many candidates have actually made a large contribution to science, but are practically not promoting their achievements, while in our times, the times of the information explosion, this is absolutely necessary. Academicians have repeatedly come to me and said that they hardly know the works of one candidate or another. Such a thing, obviously, would not happen, if the candidates were to deliver scientific reports more often within the walls of the academy, at republic seminars and congresses, and at large enterprises of the related type and to publish articles in scientific journals.

I cannot say that someone became a member of the academy undeservedly. Although several worthy candidates were not elected. But that is what elections are for.

SOVETSKAYA BELORUSSIYA: And all the same it is hardly possible to deny the influence of the material interests of the candidates. For an academician of the Belorussian SSR Academy of Sciences receives an additional 350 rubles a month, while a corresponding member receives an additional 175 rubles. Many people compare this with the situation, let us suppose, in the

United States, where they do not pay a cent for membership in the national academy of sciences. Is their system not more impartial?

A. V. Stepanenko: Let us compare the following figures. The average wage of a professor in the United States is \$100,000 a year, while that of our professor is 6,000 rubles a year. Meanwhile for fruitful work a Soviet and an American scientist need approximately identical conditions. So can we reject now the payments named above? Motives should exist in any matter.

Moreover, they are made not as an advance, but for real scientific achievements, the use of which yields or is capable of yielding a large national economic gain or advances our culture and art. Finally, the members of the academy perform much scientific organizational activity in addition to their immediate official duties. I, for example, as an academician am supervising the fulfillment of the academy's Machine Building Scientific and Technical Program and the research, which is aimed at eliminating the consequences of the accident at Chernobyl. And so it is for each academician or corresponding member of the Belorussian SSR Academy of Sciences.

SOVETSKAYA BELORUSSIYA: And still, why not enlarge the group of people being elected to the lap of the academy, as many people suggest? For example, give this right to all doctors of sciences.

A. V. Stepanenko: We believe that academicians are people who are capable of making the most objective choice. Even corresponding members on this level are inferior to them, for they have ahead of them another potential step. To some of them the election of a younger colleague as a corresponding member may seem disadvantageous, for in the future he may turn into a dangerous competitor. It is also impossible to disregard such motives. Doctors of sciences are even more susceptible to the subjective factor. Moreover, for one specialty there might be, let us assume, 30 doctors of sciences, while for another there might be three. It is clear that the former will have the majority of votes on all basic questions, even if this is to the detriment of the development of a new specialty.

Although, of course, it is necessary to enlarge the group of people participating in the election. But how? Perhaps, it is necessary to do this at the stage of the discussion of candidates.

SOVETSKAYA BELORUSSIYA: The last election is an important stage in the implementation of the new personnel policy at the Belorussian SSR Academy of Sciences. What are its next goals?

A. V. Stepanenko: The personality of a scientist is the main condition of the effectiveness of scientific research. The last 10 to 20 years have shown that it is impossible to replace one talented person even with a large number of mediocrities. Therefore, we are directing attention to the search for and "cultivation" of new scientific talents, beginning, figuratively speaking, with the "children's

garden." We will strengthen the contacts with secondary schools. We anticipate that members of our academy will conduct lesson at one of them in the Minsk microrayon of Serebryanka. Many students of physics, mathematics, and chemistry schools are also in the field of view of our scientists, and we would like the opportunity to study at higher educational institutions to be made available to the best of them. Recently we addressed to the Belorussian SSR Council of Ministers the suggestion to introduce 60 stipends of 100 rubles a month each for undergraduates of higher educational institutions, who are actively participating in scientific research. It is proposed to earmark another 50 academy stipends of 200 rubles each for the best graduate students. For the present, this unit, which is called upon to be a key one in the training of scientific personnel, is not, as is known, completely performing its functions. Talented young people often do not go there due to the material difficulties, with which the graduate student is faced. Finally, we would ourselves like...to pay higher educational institutions for specialists, but also to have the right to select the best of them. In short, it is necessary to train future academicians in advance.

SOVETSKAYA BELORUSSIYA: Aleksandr Vasilievich, the new election of academicians and corresponding members of the Belorussian SSR Academy of Sciences is expected in two years. What would you wish the potential candidates?

Stepanenko: I would like in advance to get to know them a little better. So let them "propose themselves," without waiting for the announcement on the next election.

Failure of Perestroyka To Accelerate Kazakh S&T

907401204 Alma-Ata KAZAKHSTANSKAYA PRAVDA
in Russian 31 Dec 89 p 1

[Article by B. Zhantuarov, director of the Alma-Ata Affiliate of the All-Union Center of Patent Services, under the rubric "On the Way to Sovereignty": "An Absurdity of the Era of Cost Accounting. The Lack of Receptivity of Production to the Achievements of Scientific and Technical Progress. How Is One To Overcome It?", first paragraph is KAZAKHSTANSKAYA PRAVDA introduction]

[Text] The changeover of the economy of Kazakhstan to self-management and self-financing is falling to a period of the aggravation of economic difficulties which have affected to one degree or another all the republics. And the priority task is not only not to allow the intensification of the existing negative processes, but also to achieve their overcoming.

We have decided to enter the 13th Five-Year Plan with a modernized economy. As is known, scientific and technical progress ensures its modernization to the greatest degree. It is impossible to say that the scientific and technical potential of the republic is negligible. Enterprises and organizations of Kazakhstan in three years of the 12th Five-Year Plan submitted to the State

Committee for Inventions and Discoveries 10,356 applications for inventions and received 4,686 inventor's certificates. The economic impact from the use of inventions came to 373.5 million rubles. In all 480,000 people took part in this process. It is hardly necessary to explain what technical creative is for the economy. I want to recall only that on the way to economic sovereignty it is worth interpreting in earnest its present state—with allowance made for the regional peculiarities of the development of the productive forces of the republic.

Unfortunately, in our country a great number of problems have accumulated in scientific and technical policy. During the stagnation times neither ministries nor enterprises were interested in the output of new equipment and saw nothing in it except extra trouble. But during the post-stagnation period, too, plant gates have also not been thrown open for it. In our country I development in 10 at the moment of its transfer to industry no longer conforms to the world level. Having changed over to self-financing, production workers did not rush to buy up revolutionary equipment and technology. The outlays on an innovation, as a rule, are recovered over a long period, and then on the condition of rapid introduction. Often an idea, which has been tested by scientists under laboratory conditions, works poorly or not at all in a shop. Even at experienced western introducing firms out of 1,000 proposed inventions, discoveries, and ideas only 20 percent of the projects financed by them actually yield a profit (but still projects are financed).

It is paradoxical, but precisely under the conditions of cost account the negative tendency to reject an innovation has appeared. I will try to "reveal" the mechanism of this tendency. The commodity shortage, the growth of prices, which is not restricted by anything, and the monopoly of producers—all this is provoking enterprises to derive profits and excess profits. It is possible to say that the profit itself drops into one's lap, it is sin not to take advantage of it. Here one does not have to be concerned at all about the production cost and the consumer properties of goods—everything comes "from the wheels." And immediate wealth superseded the future—it led to the reduction of main-line exploratory research and major integrated operations, which would have led foreign ones. The number of minor, optional themes and services has increased, although they are hardly capable of interesting anyone in earnest.

The drop of the creative wave has occurred. The number of inventions being submitted and registered and their use in the country as a whole, including Kazakhstan, have decreased. Suffice it to compare: In 1987 there were 85.9 applications for inventions per 1,000 scientific personnel, while last year there were 84. According to the data of the statistical collection on invention and rationalization in Kazakhstan, the greatest decreases were allowed in the systems of the Ministry of Communications, the Ministry of the Forestry Industry, and the State Agroindustrial Committee of the republic, as well as at enterprises and organizations of Dzhezkazgan, East Kazakhstan, Taldy-Kurgan, and Alma-Ata Oblasts. The

share of enterprises and organizations, which are not carrying out invention and rationalization activity at all, is significant in the systems of the Ministry of Land Reclamation and Water Resources, the Ministry of Communications, the Ministry of Grain Products, and the Ministry of the Forestry Industry—here they come to more than half.

Regretfully one also has to state the following sad fact: In all the time of the registration of discoveries in the USSR, that is, since 1957, not one has been registered from Kazakhstan (according to the data on 1 January of this year).

But the situation with introduction is especially bad. The inauspicious prospect of the practical use of innovations is forcing us to offer to the foreign market intellectual wealth, the benefit from which has not been used in our own house. However, deals of this sort are also not always successful due to the impossibility to show the buyer the best of what one has. Thus, enterprises and organizations of Kazakhstan had sent for foreign patenting (on 1 January 1989) 179 inventions, of them only 89 were assimilated by industry. But a businessman will not take a risk for the sake of one "unadorned" idea, however tempting it is. Only an embodied idea will convince him.

A sad conclusion automatically comes to mind: Innovation is incompatible with cost accounting. I believe that I am not alone. I read in a work of the well-known economist P. Bunich: "If you want to make a scientific and technical revolution at its highest spiral, the worst means for this is to switch things over to cost accounting."

Is there a way out of this economically absurd situation? There is. Moreover, precisely through cost accounting. By using all the best that regional independence can give—the possibility of the free shifting of assets and resources, cooperation with other regions and the center—it is possible to achieve the improvement of the management of scientific and technical progress. The bringing of the national economy to a qualitatively new level depends on the acceleration of its pace, so that the task is important and strategic.

Without aspiring to complete coverage, I will try to examine the means of stimulating this process under the conditions of regional cost accounting. The establishment within the republic of a centralized interbranch fund for the use of advanced inventions might be one of the forms, which combines well with republic economic sovereignty. The deductions of assets of enterprises for scientific and technical development, which are not taxed, could be included in it. While only the sums, which are needed for current improvements, would be left to them. It is possible to tie the standard of the deduction to the value of the active portion of fixed capital.

One should not forget that even in developed capitalist countries nearly half of the expenditures of this sort are

covered by the state budget. For example, Japan is deservedly considered the model of the management of scientific and technical progress at the government level. I believe that our budget should also "pull" such a burden.

Another form, which can exist along with the first, is the establishment of joint stock companies, consortiums, and associations with union and foreign firms for the solution of major problems. Each enterprise will invest assets subject to its possibilities, and in case of success each participant will receive his share of the additional profit—according to the investment. In case of failure, which is also possible, this would be as ruinous as if one enterprise bore all the expenses.

Venture, or risk, firms, which have become widespread abroad and which have the right to attract the assets of various enterprises, organizations, and the republic budget, as well as bank credits, among which the Republic Innovation Bank will play a decisive role, can be a version of such a method of financing scientific and technical progress.

Other versions are also entirely possible. The main thing is to eliminate the psychological estrangement from innovations, which supposedly yield only losses.

Here is what else is important. Republic comprehensive goal programs in the most important directions of the economy are now being formulated. Their accomplishment requires the in-depth analytical study of patent and other scientific and technical information. However, the existing level of the organization and conducting of patent research in the republic for the present is still low. This makes impossible the objective identification of the technical level and trends of its development and the choice of promising directions of the development and devising of coverable technical solutions and competitive models of equipment and technology.

In Kazakhstan there are a large number of organizations, which perform in one way or another a number of identical functions in the area of patent and license, legal, and information activity—the Chamber of Commerce and Industry, the Institute of Scientific and Technical Information (the Kazakh Scientific Research Institute of Scientific and Technical Information and Technical and Economic Research), our affiliate of the All-Union Center of Patent Services, the republic council and the oblast councils of the All-Union Society of Inventors and Efficiency Experts, and the republic scientific and technical library with a patent collection. In individual directions these organizations could cooperate fruitfully, and such work is being performed, but it is, as a rule, of an occasional, temporary nature. There are several reasons for that—narrow departmentalism, vanities, and everything that in bygone years accompanied the cost-is-no-object economy. Excessive assets are being spent, measures are being duplicated, personnel are not specializing in directions. While those, for whom all this is being done, are suffering from this

It would be advisable to establish an association for scientific and technical information on market conditions. It can give invaluable practical assistance to institutes, organizations, and enterprises. The conclusion of contracts for the performance of intermediary services on development and the introduction of the latest scientific and technical achievements, the placing of orders at enterprises, the exchange of information, the performance of various types of advertising and consulting activity, marketing, the search for foreign partners, and patent market and license research are far from the complete group of questions, on which the association could work. In addition, it could assume the functions of the extradepartmental objective examination of items of equipment and technology, which are acquired abroad and are offered for sale, as well as for the introduction of promising inventions. Having combined efforts, it is already possible to talk in earnest about the use of highly skilled personnel, the experience of international cooperation, and a substantial information and printing base.

It is quite obvious that radical changes in the economy and social sphere are impossible without the rapid and large-scale use of scientific and technical achievements. Republic cost accounting will be effective only if it provides for the competent stimulation of this process. I am not inclined to exaggerate, but the obvious contradiction of the real picture requires resolute steps.

Estonian Academy of Sciences Elects New President

Election Summary

90740116A Tallinn SOVETSKAYA ESTONIYA in Russian 5 Jan 90 p 2

[Article by V. Syrnikov (ETA): "A New President of the Estonian Academy of Sciences Has Been Elected"; first paragraph is SOVETSKAYA ESTONIYA introduction]

[Text] "By my principles I am a democrat." Such words were heard in the statement of the new president of the Estonian Academy of Sciences, Academician Arno Keyerna, whose election took place on 4 January in the conference hall of the presidium of the Estonian Academy of Sciences at the general assembly of the academy.

In addition to A. Keyerna, another six candidates, among whom were Academicians Endel Lippmaa, A. Rauskas, and M. Veyderma, as well as K. Rebane, who until then had held this position, were nominated. All of them, except Academician A. Keyerna, for various reasons, which they reported to those who had gathered, requested the withdrawal of their candidacy. In the opinion of those who had gathered, the president of the Estonian Academy of Sciences should know thoroughly the structure of the present academy, while this means to know the methods of strengthening the weak spots in its

work and to see clearly the means of its further development. The president should have an irreproachable political reputation and he should be prepared to fight for our academy. The candidacy of A. Keyerna, in the opinion of the assembly participants, satisfies all these requirements, which the vote also confirmed: 32 votes "for" out of 39.

In addition to the election of the new president, at the general assembly of the Academy of Sciences it was decided: in conformity with the decree of the Estonian SSR Council of Ministers of 21 November 1989 to organize the Institute of Ecology and Marine Research of the Estonian Academy of Sciences.

New President Interviewed

907A0116B Minsk *SOVETSKAYA ESTONIYA* in Russian 11 Jan 90 p 1

[Interview with President of the Estonian Academy of Sciences Arno Keyerna, by V. Syrnikov (ETA): "The New President of the Academy: A Look at the Future"; date and place not given; first paragraph is *SOVETSKAYA ESTONIYA* introduction; last paragraph is *SOVETSKAYA ESTONIYA* conclusion]

[Text] "The scientific collective is a delicate structure, in which a free atmosphere, which is conducive to scientific activity, should reign," such is the opinion of the new president of the Estonian Academy of Sciences, Arno Keyerna, who was elected to this position on 4 January at the general assembly of the Academy of Sciences. How does the new president see the future of the Estonian Academy of Sciences?

E. Keyerna: I would single out two basic directions: an external one and an internal one. The external activity of the Estonian Academy of Sciences and its presidium and my external activity personally will be aimed at the development of a unified scientific potential of Estonia. This does not mean that the Academy of Sciences will hold the dominant position in the scientific life of the republic. The Academy of Sciences, the higher school, and departmental institutes should not exist in isolation, there should be the closest contact among them. Previously strict departmental subordination did not provide an opportunity for such necessary close cooperation of scientific institutions. In connection with this the themes of scientific work were not coordinated and were aimed more at the filling of union orders than at the meeting of the needs of the republic. I see the priority task in breaking down departmental barriers and developing a unified scientific potential of Estonia.

SOVETSKAYA ESTONIYA: But still, what do you think, where should the scientific center, the nucleus of Estonian science be?

E. Keyerna: At present the scientific community of the republic is expressing the opinion that the scientific center of Estonia should be formed around the university. I share this point of view. Within the walls of the

university we can accomplish the task of training personnel both for the national economy and for science. The question of the "change of subordination" of institutes and their concentration around the university cannot be settled immediately. It also cannot be settled by force. The personnel themselves of institutes should decide whether or not departments and institutes are to be in the system of the university.

SOVETSKAYA ESTONIYA: And what steps do you intend to take in the area of the "internal policy" of the Academy?

E. Keyerna: It is possible to define it by two concepts: decentralization and democratization. We have freed ourselves from party supervision in science. Not that long ago the themes of scientific research were prescribed to us, works were reviewed by "responsible officials," who most often were not competent in the matters in question. Therefore, today we are against a "ministry of science." A large portion of the administrative and, what is the main thing, financial questions of the Academy should be settled in the parliament of our republic, through a special commission. It is absolutely useless, in my opinion, to submit basic decisions, which concern the vital activity of scientific institutions, for consideration by the Academy of Sciences. They should be settled independently at the institute level. The presidium, apparently, will sharply reduce its administrative functions, which, of course, will entail the reduction of the staff of the presidium.

SOVETSKAYA ESTONIYA: But is the presidium of the Academy of Sciences then needed?

E. Keyerna: Such a necessity exists. The presidium will remain an organ which formulates policy in the area of the basic sciences. It will play a vital role in the coordination of the actions of institutes of different types, which are working on the same theme, and in the development of programs at the meeting point of sciences. Of the administrative functions such a question as capital construction will remain in the competence of the presidium. In case of the division of assets among institutes the allocated assets will not be enough for each of them separately.

SOVETSKAYA ESTONIYA: What do you think of the participation of scientific personnel, who are members of the Academy, in the sociopolitical life of the republic? Can a scientist combine fruitful work and energetic political activity?

E. Keyerna: He can. Here is a vivid example. Academician Endel Lippmaa is a talented scientist and an outstanding politician. I personally support the participation of members of the academy in the sociopolitical life of the republic. Moreover, I believe, we will work in close contact with the Union of Scientists of Estonia.

SOVETSKAYA ESTONIYA: Allow me one personal question. Did you want to become president of the Academic of Sciences?

E. Keyerna: Frankly speaking, this had not entered my plans. I wanted to devote myself more to my own scientific work. Moreover, it seemed to me that a person a little younger should have become president. But still I decided not to decline.

Arno Keyerna is an economist. And now, when Estonia has converted to republic cost accounting, perhaps it is necessary for precisely an economist to head the Academy of Sciences.

Regional Issues Stressed at MSSR Academy of Sciences Meeting

907A0120B *Kishinev SOVETSKAYA MOLDAVIYA in Russian 16 Jan 90 pp 1, 2*

[Article by ATEM correspondent A. Tanas: "Meetings With Scientists"]

[Text] The new directions in the work of scientists of the Moldavian SSR Academy of Sciences and the urgent tasks, which face them in the matter of consolidating the healthy forces of society in the interests of perestroika, were discussed at the meetings of First Secretary of the Moldavian CP Central Committee P.K. Luchinskiy with the collectives of its departments.

In the Social Sciences Department President of the Moldavian SSR Academy of Sciences A.M. Andriyesh opened the meeting. While talking about the main directions of the work of its institutes, the great responsibility of scientists, and their place and role in the stabilization of the sociopolitical situation in the republic, the speakers stressed that under the conditions of glasnost and democracy, which are expanding with every day, the detailed, comprehensive analysis of phenomena, events, and facts of both the historical level and present reality is required of them. The research of specialists in the field of history, language, literature, art studies, and ethnography should be aimed today first of all at the revelation of the "blank spots" of the history of not only the Moldavian people, but also the national minorities which live on the territory of the republic. Perestroika has afforded the opportunity to tell the whole truth about all the periods of development of the region.

It was noted that the social sciences, the research and forecasts in the area of which to a significant degree influence the formation of public opinion, until recently were strictly regulated. Tens of decrees, in which it was prescribed in what direction to do research and even to what conclusions to arrive, have been adopted in recent years. It is quite natural that this precluded pluralism in the works of social scientists.

Life itself suggests that the approaches to humanities problems, as, incidentally, the management of research in these fields of science and their financing, require radical restructuring. Scientists of this type should help in the objective coverage of urgent questions of the present, and not illustrate some principles or others, which were prescribed beforehand "from above." The

situation in recent times has been changing, although slowly, for the better. However, many difficulties remain. Among them is the lack in the republic of the archive materials that historians need as authentic witnesses of the past. In the majority of cases for familiarization with them one has to go outside Moldavia and the country, while the assets, which are allocated for these purposes to the Social Sciences Department, are totally inadequate. Associates do not have the elementary conditions for fruitful work. For example, at the Institute of Language and Literature for more than 20 years 10 people and more each have been working in offices, where it is possible to place only 4 desks.

The problem of space for the library has become a common one for the entire collective of the Academy. Talks on it have been going on for many years, but without result. While due to its lack scientists are deprived of the opportunity to have handy various union and foreign publications that are extremely essential to them.

The inadequacy of the assets, which are being allocated from the budget for the financing of academic basic research, was also discussed at the meeting with the collective of the Biological and Chemical Sciences Department. True, here, in contrast to social scientists, the scientists earn certain assets by fulfilling contracts with production units. During the last year alone by means of this the department took in about 5 million rubles. Many developments, which have acquired fame not only in the country, but also abroad, first of all in the field of quantum chemistry, belong to its institutes. At present western foreign firms are supplying scientists with advanced electronics and equipment in order to help bring innovations more quickly up to the stage of implementation. But all this is insufficient.

Scientists of the department are introducing in production steroid glycoside. After its development at the Institute of Chemistry it was carefully studied in laboratories of the Institute of Ecological Genetics. The treatment of the seeds of various crops with this preparation provides a substantial increase of their yield. This development has interested many countries, which have invited the authors to duplicate their innovation abroad.

While commending the services of scientists of the department, the first secretary of the Central Committee stressed the importance of the effective influence of developments on the increase of the yield of agricultural crops. Under the conditions of Moldavia this is of fundamental importance. Comprehensive research on the problems of the adaptation of plants is one such direction of the activity of the collective. All the factors of the positive and negative effect of the environment on them are being carefully studied here under the constant supervision of scientists. Their generalization will make it possible to develop and turn over to agriculturists a specific package of suggestions and practical recommendations.

During the meeting with the collective of the Physical, Technical, and Mathematical Sciences Department the developments of scientists, which have a direct outlet not only to the national economic complex of the country, but also beyond it, were discussed. One of the directions is the technology of processing the limestones, which occur in the depths of the republic, and the obtaining of such an expensive material as artificial wollastonite. It is being used successfully in electronics, ceramics, and construction. Laboratory tests of it have already been conducted. Equipment for setting up the production of this material in Moldavia is now being purchased jointly with the Ministry of the Construction Materials Industry.

While familiarizing himself with developments of scientists of the Physical Technical Institute on nontraditional sources of the obtaining of electric power and heat, the first secretary showed an interest in why the percentage of their use is so low in the republic. For by means of solar power plants it would be possible to dry fruits and to supply livestock farms and individual houses with hot water and heat. In the opinion of scientists, the reason consists in the high cost of such systems. Less expensive plants, which will be tested at its own solar testing ground, which is being established in the department, are now being developed at the institute. They also noted that enterprises of the republic are reluctantly agreeing to the introduction of the new equipment and technology. Only a few of them are investing assets for these purposes. In order to interest manufacturers in this, the collective of the department has been forced to produce at its own pilot works small series of advanced equipment.

However, the department does not have the opportunity to assimilate the production of all innovations. But there are quite a number of them here. There is, for example, the method of electric spark alloying, by means of which it is possible to lengthen by two to threefold the time of use of machining and cutting tools. The establishment of even a small works of this type would make it possible to reduce substantially the importing of such tools to the republic. It seems that with the changeover to regional cost accounting this idea will find application.

Among the problems being worked on by scientists of the institute the electrical technology of processing whey is attracting particular attention. Being a waste product of milk production, it carries away with it practically all the elements of the periodic table. Now nearly half of the whey goes into the sewer system. But it is possible to extract from it not only high quality proteins, but also lactic acid, which in its qualities surpasses citric acid. Pilot plants, which already this year will be tested at the Kishinev Dairy Combine, are being produced at the institute.

The meetings convincingly demonstrated that the Academy of Sciences has a significant scientific potential. At the same time many ideas and developments of scientists for the present are being poorly introduced in

production. The reasons for this are diverse, but stability in society is the most important condition for the advanced developments of scientists to find practical application quickly and to yield a real return. How is one to move toward it? First of all, the first secretary of the Central Committee stressed, through the mutual understanding and the harmonization of the relations of all the people living in Moldavia, through constructive dialog, and through the recognition for everyone of equal rights and duties. The correct, healthy public opinion on urgent questions of economic development, social and cultural life, ecology, and so on can be formed in the republic only in case of such an approach. In connection with this he made the suggestion that the scientists of the Academy of Sciences through the press, television, and radio respond more actively to all the events occurring in Moldavia. Both individual statements and the collective participation of members of the Presidium of the Academy of Sciences and of groups of scientists of the Social Sciences Department in round-table meetings can also be this. It is important that the truth would originate in the comparison of various opinions and arguments. It is necessary to improve our life, with which everyone is dissatisfied, by common efforts and by the consolidation of all the healthy forces of science.

During the meetings P.K. Luchinskiy answered questions. In conclusion his conversation with the members of the Presidium of the Academy of Sciences and the executives of its party and public organizations was held.

Secretary of the Moldavian CP Central Committee Ye.V. Sobor took part in the meeting with the collective of scientists of the Social Sciences Department.

Latvian Science Policy Program Criticized

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19 Jan 90 p 2

[Article by Candidate of Technical Sciences V. Panasenko under the rubric "We Are Discussing 'Suggestions on the New Mechanism of the Management of Science in Latvia'; 'Science of the Republic or Science in the Republic?'"

[Text] Obviously, rarely can any scientist take seriously and without irony such expressions as "theoretical mechanics of the Latvian SSR" or "solid-state physics of the Ivory Coast." Such a reaction is dictated first of all by the fact that science is an integral product of human activity and a component of the universal development of intelligence on earth, including in Latvia.

The development of science in Latvia has given human civilization a large number of ideas and famous names. Let us recall Paul Valden, rector (in 1917) of Riga Polytechnical Institute, founder of the dynamic stereochemistry of nonaqueous solutions, academician of the Petersburg Academy of Sciences, honorary member of the USSR Academy of Sciences, rector of the Petersburg Academy of Sciences, honorary member of the USSR Academy of Sciences, and rector of Rostock University

(Germany, 1919). Or the ideas of Fridrikh Tsander, a scientist and inventor, a pioneer of rocketry. And the linguistic activity of Yanis Endzelin, which is divided into three periods: the Dorpat (Tartu) (1903-1908), Kharkov (1909-1920), and Riga (1920-1961)! It is also possible to cite a number of names of contemporary scientists, such as algebraist Plotkin and cyberneticists Rastrigin and Yakubaytis.

The achievement of new scientific results is possible, especially in our times, only on the basis of the combination of the creative activity of representatives of science, the extensive publicity of the results of their labor, the development of systems and centers of information supply, and the establishment of international creative collectives.

In the history of science we find quite a number of examples of that. The fruitful international collaboration of scientists at the institute of N. Bohr and at the Cavendish Laboratory of E. Rutherford is the most significant of them. But, perhaps, we will not knock at an open door and try to prove what was proven long ago by life itself. At the same time we read in "Suggestions": "...to envisage the formation of the budget assets, which are necessary for the financing of science (within the framework of the republic tax system); the specific nature of taxes in the area of science, so that organizations, which are engaging in applied research and development and are not working for the republic, would pay greater taxes than those that are working for the republic..."

In the consciousness of every scientist there always was, is, and will be the thought that all the preceding and present communities of scientists and their achievements are equal coauthors of his scientific results. A respectful, considerate attitude toward the generalization of the results of the creative activity of scientists and toward all science found reflection in the concepts and terminology, in which first of all the very same integral function of science, its integrity, is adequately depicted. Therefore, a number of new concepts, which have been introduced in "Suggestions on the New Mechanism of the Management of Science in Latvia," cause annoying bewilderment.

Thus, instead of the concepts "science in Latvia," "the development of science in Latvia," "the contribution of scientists of Latvia to science," and so on, which are common in meaning to all mankind, we encounter in "Suggestions" extremely conservative expressions that are permeated with the spirit of stagnation and separatism: "science of Latvia," "the contribution to science of Latvia," and so forth. This is not a harmless play on words, but ideas and the process of national revival in Latvia, which are inadequately reflected in the consciousness of a group of scientists and have been incorrectly projected onto creative scientific activity.

The poverty of spirit and the primitivism of the goals that are expressed by the concepts "science of the republic" and "the contribution to science of the republic," which it is proposed to use for the formation and making of decisions, for the drawing up of a draft law on the procedure of tax assessments, and for the determination of the list of scientific organizations that are working for the republic, stand out in sharp contrast against the background of the historical process of the development of science.

In this connection the submitted suggestions in their essence are antidemocratic, since they are based first of all on the isolation of the scientific research, which is being conducted in Latvia, and presume discriminatory steps in the area of research that will not conform to the optimum notions of a limited number of qualified, local scientists, who belong to the council for science and the proposed expert councils. The suggestion: "To establish a competent group of scientologists (by competition) made up of about 10 people, the task of which is to study the development of science of Latvia and its fields," resounds in the best traditions of the bureaucratic "mafia."

Yes, the task of the winners of the competition, who will become members of this group, will not be among the easy ones.... They will have to remember not once and not twice the famous aphorism of Kozma Prutkov: who did not recommend that one lay hands on what it is impossible to grasp.

But the main difficulties await local scientologists, if instead of the organization of the development of science in Latvia and the encouragement of the activity of any talented person of science they will implement in practice the unethical policy of the isolation of science in Latvia from all-union and world relations by filling with a far-fetched content such a concept as "the contribution to science of the republic."

At present first of all scientists themselves are taking extensive interest in the study of the organization of scientific work, since only they can correctly estimate the organizational measures that are necessary for the development of science. Therefore, in all countries scientists are participating in organizational work. Such a trend also exists in Latvia.

It is possible to divide the organizational measures for the development of scientific activity into three groups. The selection and training of scientific personnel are included in the first. The development of the directions of scientific research, which meet the requirements of science, culture, and the economy, is included in the second. And the supply of the material base, which is necessary for the performance of scientific work, is included in the third. Among all the factors, which are taken into account when organizing scientific activity, there is one that has the most significant influence on the

"health" of science—the factor of its unity and subordination to the progress of all mankind. While this obliges scientists of all fields to cooperate.

Precisely the intra-union and international cooperation of scientists and scientific collectives always was and always will be the most effective basis for the democratization of the management of science. Only it, this unity, also creates extensive opportunities for the very process of the flourishing of science in Latvia. The policy, which envisages the enlistment in scientific councils of various kinds of the most prominent scientists of both the USSR and other countries, conforms to the vital interests of the development of progress in Latvia. But this will be impossible, if we do not categorically reject the discriminatory steps that are proposed in "Suggestions."

There is another question, on which we should dwell. It is a question of VUZ [higher educational institution] science. In talking about the improvement of the mechanism of the management of science in Latvia, we should not pass over in silence the fact that the potential of scientists at higher educational institutions at present is being used far from completely.

The gap between higher educational institutions and scientific institutes is extremely harmful. The need has arisen for their interconnection and the establishment jointly with the Academy of Sciences of a number of intellectual centers. This is important not only for the improvement of the present state of affairs in science, but also for the future. The instruction of students should be closely connected with scientific work. Active young scientists should supervise young people. The giving of courses of the basic disciplines, as in former times, should be assigned to the most prominent scientists and should be imposed on them as an exceptionally honorable job. It is very important that the foundation of knowledge would be laid by individuals who are distinguished in science.

"Suggestions" in no way take into account many urgent aspects of VUZ science.

What this document offers us is a step backward, not forward. And today scientists must not hold their tongue and play silent.

Role of Scientists' Union in Reorganizing Latvian Science

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[Interview with Corresponding Member of the USSR Academy of Sciences and Academician of the Latvian SSR Academy of Sciences Elmar Yanovich Gren, responsible secretary of the board of the Union of Scientists of Latvia, by Andoriy Darzinysh: "The Democratization of Science Is the Goal of the Union of Scientists of Latvia"; date and place not given; first two paragraphs are NAUKA I MY introduction]

[Text] Scientists of Latvia have actively joined in the ideological shaping of the national awakening together with creative unions and with the representatives of several not yet organized public groups. They have also succeeded in laying the foundations of the future of Latvian science—earlier not a bright castle of science, but an administrative bureaucratic fortress was erected on the old, imported foundation. Thus, the Union of Scientists of Latvia (SUL)—one of the first public, but at the same time also professional organizations of the new wave in the republic—was established.

You will find out about the first steps of the SUL, which has shouldered the heavy burden of responsibility, from the conversation with Corresponding Member of the USSR Academy of Sciences and Academician of the Latvian SSR Academy of Sciences Elmar Yanovich Gren, responsible secretary of its board.

NAUKA I MY: The first year of activity of the union has concluded. The end of the year nearly coincided with a most important event for scientists of the republic—with the approval at a session of the general assembly of the Academy of Sciences of the new concept of the management of scientific research. I am comparing it with the draft of the concept of the organization and financing of Latvian science, which was drawn up earlier by the SUL: Was it possible, it seems, to achieve a compromise?

E. Ya. Gren: It is actually possible to speak of a partial compromise, if you consider the adoption of the concept of the Academy of Sciences the result. However, initially no alternative version to our draft existed. Therefore, the concept adopted at the session first of all is a document of the Academy of Sciences; if you wish, it is possible to call it a parallel, compromise, and alternative version.

NAUKA I MY: That is, do there exist, in your opinion, two independent designs of the building of Latvian science?

E. Ya. Gren: Yes, the approval of the academy program does not signify that the SUL will renounce its own. Our representatives were actively enlisted in the drafting of the academy document and by their presence and participation had a serious influence on the end result. It was possible to bring the positions significantly closer, but this all the same is not the version, which the Scientific Council of Latvia—the highest legislative and executive organ of science of the republic—could take as the basis of its work.

Of course, there is no need to begin a new round, no need for the representatives of the Union of Scientists and the academy to meet again and to seek some third means. Let this be left to the discretion of the Scientific Council, inasmuch as real changes in the mechanism of the management and financing of science will depend on its position.

NAUKA I MY: And still what is the difference of the points of view of the Union of Scientists and the academy? The cornerstone of your draft is the principle

of the separation of the legislative, executive, and monitoring functions in the organization of scientific research. What objections is the academy raising to it?

E. Ya. Gren: It cannot be said that on this issue we have opposing views or disagreement. In the document of the Academy of Sciences it is simply not specified clearly enough. The Scientific Council of Latvia combines both legislative and executive power.

NAUKA I MY: But where are scientists to turn to in controversial cases?

E. Ya. Gren: Indeed, in the academy concept no place was found for monitoring organs. We envisaged an independent scientific expert commission. Namely, that along with this expert commission, which examines research projects that have been submitted for competitions, an independent board of arbitration would also exist. It could look into all claims, so that it would not have to seek the truth from the people, with whom the conflict arose. I understand that doubts about the necessity of such an organ might arise—it threatens, they say, new bureaucratization and organizational heaviness. However, the question of the distribution of finances is serious and is capable of evoking an extremely sensitive reaction. Therefore, I believe that it is necessary to support in every way the aspiration to ensure objectivity, even if this will require a quite high price. It cannot be helped, it is necessary to pay. It is possible to regard this as a kind of precautionary action, which is impossible after the fact, and then one will have to calculate far greater losses.

NAUKA I MY: Another basic concept of the Union of Scientists, which specifies the basic organizational form of scientific work—the scientific group—is connected to a considerable extent with the financing of research. The academy concept assumes that the old procedure of financing, when assets are sent directly to institutes, simultaneously remains in force. But in such a case will the forces not be too nonequivalent? Just how will the scientist or even a group of scientists be able to oppose administrative pressure?

E. Ya. Gren: The academy concept is not at variance with the principles advanced by us. True, this issue again remained without the proper emphasis. On no account must it be allowed that the administration of an institute would dispose of money entirely at its own discretion or, using its power, would do this secretly. In the new system of the organization of science the administration should mainly see to it that it would provide individual groups of scientists with everything necessary for work.

However, world experience has proven that every institute needs its own basic financing. This condition is also an unwritten law of our concept. And at first, while we have not yet learned to work in accordance with the system of competitions and contracts, the base for financing should be as substantial as possible. Later it can be reduced, but cannot completely eliminated for two main reasons. First, as a result of the competitive

system institutes will no longer receive year after year their guaranteed money "ration." Such fluctuations, which are due to the lack of a stable base of financing, can put the institute economy under heavy stress. One must not leave absolutely dependent on the successes of scientists in competitions the subdivisions that serve them.

Second, institutes need assets for the stimulation of the development of new scientific directions. This research involves a high degree of risk and might not yield the anticipated result. In such cases one must not announce an open competition. I stress that the right to dispose of these assets should be in the hands of the scientific council of the institute, not the director.

Without basic financing in science random factors might play too great a role.

NAUKA I MY: The postulate of the academy concept, which paid certain tribute to the ideology of former organization and which declares as the main goal the optimum use of the scientific potential of the republic in the interests of the national economy of the republic, is also, in my opinion, extremely debatable. Here the old utilitarian approach to scientific research is visible and the conclusion, which has been proven by practice, that the degree of scientific and technical progress is determined by the level of basic science, is ignored. The question is, is there any point to the forcible attachment of science to production?

E. Ya. Gren: We will devote much attention to this problem during the formulation of the concept of the Union of Scientists. Our point of view is clear—we should strive for the legalization of the priority of basic science. At one time a large number of speeches and declarations were devoted to this theme, for example: There is nothing more practical than a good theory. However, the real situation was completely different, it not so much contributed to the development of theory as is made it incumbent to "drum up" assets for purely utilitarian needs. The pressure on basic academic sciences continued year after year. There was declared as the basic criterion of the work of a scientist the effectiveness of the introduction of his research. Under the effect of this pressure a special category of scientists and managers was "bred." Their arguments are not an innovation in science, but a stream of words with regard to the "enormous importance" of one study or another, which is uttered merely for the sake of extracting as many more assets as possible. In this way technocrats and administrators found themselves in science. It is necessary to do away with this system, it has completely discredited itself.

NAUKA I MY: But when doing away with it, it is necessary to think about how to determine correctly the place of basic science and not to run to the other extreme.

E. Ya. Gren: In my opinion, two important aspects should be taken into account.

First, we often put the wrong meaning in the concept "basic science," linking with it all the fields of science, which do not belong to the applied fields. As a result the extremely thick layer of what is called "gray" science is attached to basic science. This is a scientific morass, which does not give anything either to theory or to practice. One of the main tasks of the competitive system is also to eliminate the simulation of scientific activity, which is still widespread today.

Second, it is necessary to exempt our science from obligatory direct contact with production. This by no means signifies and permits isolation from social and national economic problems. This would be a fatal mistake.

NAUKA I MY: It even seems to me that the duty to see to the introduction of the results of its research has been assigned to basic science intentionally, in order to transform it into a servant of the economic system, which is incapable of self-development, and so that those, who hold responsible positions in the hierarchy of this system, would have an opportunity to find a scapegoat for the total lag.

E. Ya. Gren: Here it is appropriate to recall that in Latvia alongside the vast scientific personnel of institutes of the Academy of Sciences (1,800 people) 7,800 people work at sectorial institutes. The academic system should become the center which would provide sectorial institutes with new ideas. But these ideas should be competitive at the highest level. Then the applied sciences will also acquire a different quality.

Under no circumstances can we allow developments of the applied sciences, which are connected with the introduction and production of new technologies or materials, depend on budget financing. It should come directly from enterprises. But this is the version of the somewhat distant future, toward which the concept of the Union of Scientists is oriented. Inasmuch as at present our production is too sluggish, here it is still possible to work in the old way and in general to manage without science.

NAUKA I MY: Thus, scientists of the republic are interested in the quickest radical reform of the economic system. Only under the economic conditions of a free market will enterprises be forced to modernize technology independently, in order to keep afloat in the stream of competition.

E. Ya. Gren: Yes, only in such a case is the complete implementation of the concept of the Union of Scientists possible. This is simultaneously both a condition and a goal. Otherwise neither the economy nor science of Latvia will have a future.

NAUKA I MY: The academy concept envisages the establishment of councils of sectorial sciences and programs. There will be quite a number of them. Will the problem of job placement not be solved owing to this for

many functionaries? Will these councils not turn into a crack, through which old methods of management will be able to seep?

E. Ya. Gren: It is possible to debate this. Representation in the Scientific Council of Latvia (USL) will be limited and will come to about 40 people. It would be impracticable to represent all sectors in the council. The USL just on its own will be unable to formulate forecasts and to depict the prospects for every sector. This is within the power only of reorganized sectorial councils. But it must not be allowed that they would have the decisive word in the distribution of finances. In such a case the possibility of a certain usurpation of power appears. However, the system of the scientific expert commission, I hope, will guard against this. I am personally in favor of sectorial councils.

NAUKA I MY: Hence, in your opinion, this is one of the features that make it possible to rate the academy concept favorably. Moreover, the stage-by-stage transition to the new organization of science is specified in the academy version.

E. Ya. Gren: Yes, in our concept these stages are not specified, we also did not strive for this, in order to emphasize the ultimate goal. If our concept were taken as the basis, the Union of Sciences would undertake the formulation of the individual stages. In the academy document both of these tasks are accomplished simultaneously. Moreover, the principles of the formation of the Scientific Council of Latvia are also revealed there. And as a whole I see a need not so much for the criticism of the academy version as for the indication of the differences between the two concepts. In my opinion, this is a serious step toward the democratization of science, which makes it possible to get rid of the fetters of the totalitarian system. While the draft of the Union of Scientists will serve as a guide of subsequent movement.

NAUKA I MY: The work on the concept of the organization and financing of science was the most significant result of the activity of the SUL, which justified the very idea of the establishment of the union.

And all the same there is talk that this is the service not of your organization, that the members of the SUL are acting only on the basis of their own vanities and the expectation to take the helm of power.

E. Ya. Gren: The eradication of the bureaucratization of science and the development of its democratic foundations logically exclude this thesis of the struggle for power. There is no place in science for any monopoly of power, the main place in it is assigned to labor and the talented person. The apparatus exists in order to support labor and talented people. In normally organized science the role of power is negligible.

NAUKA I MY: Democracy at different social levels leads to the democracy of society as a whole

E. Ya. Gren: But this struggle is still not that close to completion. One must just not draw the vulgar conclusions that it is taking place between the Union of Scientists and the Academy of Sciences. No, as throughout society, the conservative, reactionary forces and the democratic forces are in antagonistic positions. I am even certain that at the Academy of Sciences there are quite a number of people, who will not remain indifferent to our ideas and will help in their realization. We do not have essential differences with the majority of members of the Academy of Sciences.

NAUKA I MY: Such a response inspires hope that by common efforts the new model of the organization of science will be implemented and we can proceed to the other aspects of the activity of the SUL.

What do you think, was the activity of the Union of Scientists during this time not directed too much toward its own internal problems and did not its achievements against the background of the activity of other organizations remain not properly appreciated by the community at large?

E. Ya. Gren: I cannot agree with such a point of view. First, because no one else will do for us what only we ourselves can do. And our achievements will be of importance only for society.

Of course, we cannot but keep up with the general processes. The SUL united scientists who hold a most active civic position. Therefore, we, the leadership of the union, even have to check somewhat the excessive politicization of our organization and the excessive enthusiasm for the current moment and the criticism of transient political situations or the reaction to them. This will devalue the name of the scientist, if we respond to every trifle with the same vigor as the new sociopolitical formations—for example, the People's Front of Latvia or the DNNL—are. However, at the most crucial, critical moments we are not remaining aloof. We were one of the first to support the appeal of the board of the People's Front of Latvia of 31 May of last year. Moreover, not only by declaration: We developed the idea of the restoration of the independent Latvian State in the concept (sections one to three of the concept are published in this issue of the journal—A.D.).

NAUKA I MY: But this question also has another side. Unfortunately, today the prestige of science and the scientist in society is not particularly high. Precisely for this reason the promotion of the work of the SUL could be more active.

E. Ya. Gren: Here you are, perhaps, right. Such a situation to some extent is a consequence of the period of stagnation. But in recent times our old academy guard has done quite a bit of work. Its representatives have once or twice delivered such speeches, after which many of us were ashamed: After all, judging from them, the Academy of Sciences is the bastion of conservatism.

Yes, perhaps, we have not succeeded in advertising ourselves well. True, we are placing hopes in the information bulletin of the Academy of Sciences and the SUL, *VESTNIK NAUKI*. But all the same the most important thing of all is science itself and the popularization of its importance. Therefore, a large role is being assigned to the journal *NAUKA I MY*, of which the Union of Scientists of the Latvia is a joint publisher. I believe that the members of our union will take an active part in the work on the journal.

NAUKA I MY: The SUL set as its task the defense of the rights of the scientist, which is integrally connected with the already declared necessity of democratization. Have you received any support from the trade union of the sector, for, in essence, this is its direct obligation?

E. Ya. Gren: When depicting the real role of the trade union in society, we also did not count on any support of it.

In recent times the union has succeeded in defending several scientists against persecutions. If we talk about the rights of a scientist in general, their bases are formulated in our concept, which makes it possible to evaluate clearly the results of the labor of each scientist. Rights are affected most pointedly in case of the leveling of the creative individual. This is dangerous in any sphere of social activity, and particularly in science. The restrictions of the possibilities of displaying the intellectual potential stifle the fervor in a scientist, without which there is no creativity.

NAUKA I MY: In connection with this the SUL is also performing the functions of the trade union. Therefore, it is surprising that young scientists, who should be interested most of all in the guarantee of their rights, are so few in the union.

E. Ya. Gren: There are several reasons. We have established in the union quite high skills requirements. But this is not the primary thing. Even the young people, who have joined the union, are obviously passive. It is difficult to say, but respect for the old hierarchical system or lack of faith in their own powers is perhaps to blame for this.... Then, of course, this is dangerous.

NAUKA I MY: In this connection would the union perhaps need to assume several functions of a social nature, in order to help young people prior to their involvement in serious scientific work?

E. Ya. Gren: The sources of the problem lie in the system of the training of specialists, which is in effect at present. The concept proposed by us provides for a completely different procedure. It would enable the most capable young people to join in scientific work as quickly as possible and to avoid the period of passivity, which is so widespread today.

Moreover, an academy exchange fund has begun to be established with the assistance of Latvians who live abroad. I believe that quite soon we will announce a

competition for the selection of young scientists who are willing to work a long time abroad. Of course, this will not be carried out in a mass manner.

However, in the end this is only the outward expression of the problem, the cause itself lies deeper. For normal life and work young scientists need the appropriate wage—at least at the level of a skilled worker. One of our immediate tasks is to fight for this.

Moreover,...what I will now say might not please many people. And all the same—in Latvia there are very many scientists and those people whom they call scientists. World experience shows that it is possible achieve more in science, by enlisting talented people in research and having provided them with a modern research base. By means of the new mechanism of the organization of science it is necessary to get rid of those people, who got into science by chance, in search of a quiet life, and not for self-expression or the realization of their abilities.

NAUKA I MY: Yes, what you have said may offend many people, but I doubt whether anyone today would openly dare not to agree with this. But there are also other questions which might cause some people trepidation. In recent times demands have been heard to review and revoke the academic degrees and titles of people, who received them for works that from today's point of view are not of scientific value. What is the position of the SUL in this regard?

E. Ya. Gren: I can state only my own attitude, since the question has not been considered either in the council of the union or in the board, although at our constituent congress several of the speakers also expressed their opinion on this. I do not support such aspirations and believe that the Union of Scientists also needs to guard itself against them. Of course, it would be no trouble to find the transgressors. But it is necessary to distinguish the methods, which we use for the achievement of the goal. We should not rehabilitate the means, by which at

one time the apologists of totalitarianism reckoned with Corresponding Member of the Republic Academy of Sciences P. Dzerve. Public censure should replace witch hunting. But then it is also necessary to be critical, attentive—to distinguish mandatory curtsies from abuses of the name of a scientist and the struggle against progressive aspirations.

NAUKA I MY: Unions of scientists have been established in Estonia, Lithuania, Moscow, Leningrad, and other places. These are independent organizations. But the USSR Union of Scientists also exists. On what principles are the relations of the SUL with it based?

E. Ya. Gren: In my opinion, there can be only one principle—an equal partnership. In the USSR Union of Scientists for the present other sentiments prevail: to establish a union organization made up of individual members, that is, on obsolete centralized principles. And an independent organization of scientists is being established there in Moscow to counterbalance these efforts. I believe that the attitude toward the structural formations of the organizations of the unions of scientists should be changed, the principle of confederation, which we are defending, will triumph, and we will have new allies.

But with the scientists of Lithuania and Estonia we have a common path—the Baltic Path.

We want, I believe that this desire is mutual, that Latvian scientists, who live in different corners of the world, would also walk this path beside us. Serious preparation for the world conference of Latvian scientists, which will be held next year in Riga, lies ahead of us. Let the return home, to the homeland, finally happen.

NAUKA I MY: Let us have enough endurance and let success attend us this year and on this path!

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Academician Bayev Supports Human Genome Project

907A0129A Moscow PRAVDA in Russian 13 Jan 90 p 4

[Interview with Academician Aleksandr Aleksandrovich Bayev, chairman of the Scientific Council of the USSR State Committee for Science and Technology and the USSR Academy of Sciences for the State Scientific and Technical Program "The Human Genome," by PRAVDA correspondent R. Fedorov: "Is It Necessary To Show the Cards?"; date and place not given; first two paragraphs are PRAVDA introduction]

[Text] The first research in the country on molecular biology is connected with the name of Academician A.A. Bayev, and back in 1969 the first USSR State Prize in this field was awarded to him together with a collective of colleagues. Now Aleksandr Aleksandrovich heads the Scientific Council of the USSR State Committee for Science and Technology and the USSR Academy of Sciences for the State Scientific and Technical Program "The Human Genome." It is also discussed in the conversation of our correspondent R. Fedorov with the scientist.

First of all, what is a genome? The term designates the set of genes of the body. Their initial bearer is the sex cell. The merging of two sex cells, maternal and paternal, leads to the formation of the germ cell, from which the body develops. In it the paternal and maternal hereditary elements are united, it is determined what traits of the parents their specific descendant will inherit. The genome, thus, contains a generalized plan of the development of the body and, if it is a question of the human genome, the genetic plan of man in general.

PRAVDA: What is the essence of the program, what are its tasks?

A. A. Bayev: The bearer of hereditary information in the overwhelming majority of living beings is deoxyribonucleic acid (DNA). Its molecule is formed by two strands twisted into a helix, polymer chains, the links of which are nucleotides. These are quite complex compounds, which are formed by residues of phosphoric acid, sugar (pentose), and nitrogen bases. There are four of the latter: adenine, guanine, thymine, and cytosine. They also distinguish nucleotides from each other.

DNA molecules form the chromosomes that are concentrated in the nuclei of the cells of one organism or another. Each human cell contains 46 chromosomes, 23 pair. Half of them were received from the mother, the other half were received from the father. All genetic information is also recorded in them.

Nature used a unique method of recording, storing, and reproducing genetic information—the chemical method. The four mentioned nucleotides (for brevity they are designated by the letters A, G, T, and C) constitute the four-letter genetic alphabet. We have already begun to

understand genetic language and are now making efforts to master its complete knowledge.

The Human Genome Program sets as its goal first of all to decipher of the structure of human DNA and to determine the sequence of nucleotides in the chains that constitute each of the 23 chromosomes.

The task is a difficult one. An electron microscope provides a picture of DNA in the form of the finest strand. If you "unwind" the chromosome, in which this strand is gathered into a short and thick braid, the chain of nucleotides would stretch several tens of centimeters, while the number of links making it up would come to hundreds of millions.

DNA is the substance of heredity, its molecules are capable of autoreproduction. Being replicated in all the cells of the body of an organism, which originate in the germ cell, in the sex cells, which will become the basis for the development of descendants, DNA ensures the succession and continuity of life, the constancy of its forms, and the possibility of their mutation. But the realization of the heredity, which is recorded in DNA, in a new organism is carried out indirectly. Its molecule is only a general "diagram." Its specific sections serve as a die for "stamping"—the synthesis of molecules of one protein or another, which already determines the traits and characteristics of the organism: the color of the eyes and hair, the peculiarities of the structure of the body, the activity of physiological systems, and, in the final analysis, the entire constitution and to some extent intelligence, character. The section-dies are also the genes, the units of heredity.

The complete record of the sequence of nucleotides will acquire meaning and will become readable when the mapping of genes has been carried out simultaneously: That is, the location of the genes, which predetermine one or another characteristic of the organism, is found on the strand of DNA. Now many genes, which predetermine a number of hereditary characteristics and diseases of man, have already been mapped. But some scientists estimate the total number of genes in man at 30,000, while others estimate it at 100,000.

Hence it is clear that the work is vast. Of course, it will be performed by the combined efforts of many scientists and scientific collectives. But how is one to use its results, how is one not to wallow in a 1,000-volume sea of information and to find the page of recordings, which is needed for a specific use? This should be the job of equipment—modern computer equipment. The very performance of the work on the Human Genome Program is also impossible without its extensive use and development.

PRAVDA: What will this program provide for practice?

A. A. Bayev: It is difficult to estimate in advance the value of new scientific knowledge. The most unexpected possibilities of its use might be discovered. But today it is clear that for medicine, for example, the knowledge of

the "molecular anatomy" of man will become just as important a milestone of development as were the discoveries made in the 16th century of the founder of modern anatomy: Andreas Vesalius, author of the work "On the Structure of the Human Body," and the founder of modern physiology, William Harvey, who described the large and small circles of blood circulation.

The Human Genome Program includes the study of the molecular bases of hereditary diseases. In reality a knowledge of the proper structure of the gene—the normal sequence of the nucleotides of DNA—will make it possible to find deviations from the norm in a specific organism and, hence, to make a diagnosis. An "irregular" gene also molds an "irregular" protein. Hence follow disorders of the functioning of the biochemical systems of the body, metabolism, and the structure of cells. A knowledge of the origins of these disorders will help to find in a number of cases methods of the prevention of an illness and its treatment with drugs.

PRAVDA: As always in life, any possibilities can be used both for good and for evil. The greater they are, the greater the evil is. Let us recall the energy of the atom and the sword of Damocles of nuclear warheads from the arsenal of "potential enemies," which hangs over the planet. Does the Human Genome Program not also hold dangers of such a order?

A. A. Bayev: As a result of the implementation of the program we should obtain a molecular sketch of some average person. But the genome of each person is individual. Moreover, all of us are not ideal, everyone has some deviations from the accepted model. Those, which are responsible for unhealthy ones, of course, are undesirable. But there are such peculiarities of the genome, which predetermine or can predetermine some advantages, success in the creative activity of a musician or artist, scientist or engineer, actor or athlete.

It is possible, perhaps, to liken the genome, which will be obtained by researchers, to the standards of the meter or kilogram, which are stored in the Chamber of Measures and Weights. The comparison with it of the genome of a specific person will make it possible to detect some deviations and in a portion of cases to recognize a disease or a predisposition to it. But a diagnosis of a different level: conditionally speaking, of brilliance, can also be made. And if it were to occur to someone to make a mass check of newborn children on this basis, and on this basis to demand special conditions for the education and life of the "elite."

PRAVDA: From this point of view is knowledge of the human genome not a path, which leads to the imposition of some fatal restrictions on the development of the individual, and encroachment on his freedom?

A. A. Bayev: In such a statement of the question one can feel if not the desire, then the allowance of the possibility to halt or limit the process of cognition. But this is impracticable. The cognitive process is inevitable and continuous, inasmuch as cognizing man exists. The new

knowledge, which is obtained by him, is a natural means of his evolution. In itself knowledge is not good and not evil. Even if you think it over, it is more good, inasmuch as it increases the possibilities of man.

Science does not exist outside society, it is a part of it. And how its achievements are used and for what depends entirely on the conditions in society and on social relations. For without science.... What can the movement of the hand be? It is possible to strike a blow with it, it is possible to greet a friend, to caress and stroke the head of a child.

In 1921 V.I. Vernadskiy wrote: "The time, when man will get atomic energy in his hands, is close.... This might happen in the next few years and might happen in a century. But it is clear that this should be." At the same time, at the beginning of our century, K.E. Tsiolkovskiy anticipated the development of space. Today both have come true. This convincingly testifies to the continuity and irrepressibility of the process of cognition and the impossibility of halting scientific inquiry and at the same time the practical use of the knowledge obtained by science. And science in itself is not at all to blame for the fact that the threat of nuclear war remains on the planet, while "spy" satellites fly above the planet....

But let us return to the human genome. First of all it should be recalled that there are monogenic characteristics and properties of an organism, which are predetermined by a single gene, and polygenic ones, which depend on a set of many genes. The genes of a number of hereditary diseases, for example, are already known. The creative abilities of a person are probably predetermined by many genes and, moreover, are susceptible to the influence on their formation and manifestation of social and in general external conditions. A complex game of probabilities, which precludes predictions, exists here. Remember how many possibilities a deck of playing cards or the 68 squares of a chess board hold.

In general the problem of the genetic predetermination of the intelligence of a person and his creative abilities does not have an unambiguous solution from the point of view of genetics. Several prominent scientists not without reason believe that it does not exist at all.

It is necessary to take into account that the gene contains only a program of development. The proteins, which form the structures of cells, are built in accordance with the information recorded in the genes. During their differentiation various tissues of the organism, then the organs, and, finally, the organism are formed. At each of the transition stages deviations from the plan of its formation, which was initially outlined in the genes, may occur. In short, the genetic program does not preclude an alternative.

Nevertheless the study of the molecular structure of the genome opens the way to the discovery of the mechanisms of the individual development of an organism and

the mechanisms of evolution and to a deeper understanding of biochemical and physiological individuality. All these are general, basic problems of biology.

But this research also opens the way to the accomplishment of practical tasks. Knowledge of the genome reveals the molecular, genetic basis of hereditary diseases. At times not the disease itself, but the predisposition to it is incorporated at the molecular level—in the genes. In both cases the search for means of diagnosis becomes possible, while sooner or later genetic therapy will become a reality.

PRAVDA: A second question follows from the prospects of genetic engineering. Therapy, treatment is an indisputable benefit. But does not genetic engineering afford opportunities for criminal interference in "the affairs of nature"? In particular, is the development by genetic interferences of an artificial "race" of weak-willed, obedient people—human robots, "makkurts," about which Chingiz Aytmatov told in the novel "I dolshe veka dlitsya den" [And the Day Lasts Longer Than a Century]—not possible? Foreseeing such a jesuitical possibility, should one not stop somewhere or abandon altogether the implementation of the Human Genome Program?

A. A. Bayev: Apprehension of this sort is simply unwarranted. As was already said, many qualities of the human personality are polygenic, are governed simultaneously by many genes. Manipulations of genetic engineering are extremely difficult. In the final analysis it is possible to obtain human robots without the participation of genetics.

PRAVDA: Is it easier for dictators to take the path of psychological and social influence on the individual?

A. A. Bayev: Judging from historical experience, yes. Large-scale science is not needed here. Returning to science, it is again necessary to repeat: Bans on its development and the confinement of knowledge to some limits are absurd. Science will surely step over the set boundaries, to which its entire history testifies. The practical use of knowledge is a different matter. The code of ethics of the scientist, the understanding that it is possible to use any knowledge to detriment, and the sacred following of the rule: do not harm the individual, should be in effect here.

PRAVDA: The program is labor-consuming and expensive. The difficulties facing us are well known. There is not enough money for the implementation of urgent social programs. Is the Human Genome Program such an urgent one? Especially as they are working on it in many of today's wealthier countries. While we will get involved later...is it possible to reason this way? What are your grounds for the urgency of the research of Soviet scientists on the implementation of the Human Genome Program?

A. A. Bayev: About the urgency. It is necessary to begin scientific research in some new field as soon as the first,

slightest opportunity for this appears. With respect to the human genome we have methods of research, its tools, and ideas. One must not forget the humanistic orientation of the program: The object of its research is man, whose existence on the planet under the conditions of the increase of environmental pollution and its saturation with mutagens is becoming harder and harder. Finally, there is the following consideration: We lag seriously behind the leading countries in the area of research on human genetics. The abandonment of the program will aggravate the situation and will make us fall behind even more. It will be much more difficult to catch up later.

Of course, in contrast to the space, atomic, or computer program, studies of the human genome have a peaceful orientation. The same American scientists, it is possible to hope, guided by humane considerations, will not conceal their results. It would seem that it is possible—until better times—to follow quietly the course of world work on the study of the genome.

However, no one likes spongers. An example of this is the recent statement of Noble Prize winner J. Watson, who was awarded the loft prize (jointly with F. Crick and M. Wilkins) for the establishment of the molecular structure of DNA and its role in information transfer in living matter. He literally attacked Japan for the fact that this country grudges spending money on studies of the human genome, preferring to use the results of the work of American scientists. J. Watson demanded that Japanese colleagues be cut off from scientific information in this area and that they not be let into the achievements of American science.

I believe that we must not lean toward sponging with the risk of being cut off from the exchange of information, from the very world course of research, and from keeping pace with progress. For the work on such a significant, world-level program has not only independent value. The importance also lies in the fact that it requires the collaboration of many related fields and pulls up their level. It is impossible to use the enormous amount of information on the human genome without the development, for example, of computer technology, research is impossible without the appropriate reagents—the product of fine chemical technology—and without instruments.

In conclusion I cannot but express satisfaction with the fact that the leadership of the USSR State Committee for Science and Technology and the USSR Council of Ministers shared the opinion of scientists of the USSR Academy of Sciences on the importance of the problem and recognized the necessity of allocating assets for the development of the work.

Institute Provides Technical Support for MVD

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[Article by Candidate of Technical Sciences Yu. Silantyev, deputy chief for scientific work of the Scientific

Research Institute of Special Equipment of the USSR Ministry of Internal Affairs, under the republic "You Asked to Tell": "Science and...Law and Order"]

[Text] "Recently, while speaking at the press center of the USSR Ministry of Foreign Affairs, USSR Minister of Internal Affairs [MVD] Bakatin said that the technical equipment of the Soviet militiaman is one-fifteenth that of the western policeman. Are there scientific institutions which supply our militia with equipment? And if there are, how do they operate?"

[Signed] Ye. Lyublinskaya

Kirovograd

Candidate of Technical Sciences Yu. Silantyev, deputy chief for scientific work of the Scientific Research Institute of Special Equipment of the USSR MVD, responds.

Our institute develops practically all types of equipment for the services of the ministry. Fire extinguishing aids and security equipment for buildings constitute the exception. The All-Union Scientific Research Institute of Fire Fighting Equipment deals with this.

Of course, our institute alone cannot develop for the MVD the entire arsenal of means of individual protection and active defense and communications, transport, optical instruments, chemical preparations, television equipment, sound recording equipment, and much more. Here cooperation with academic institutes and the Siberian Department of the USSR Academy of Sciences has been organized. We maintain ties with more than 30 ministries and their scientific research institutes and about 140 enterprises.

If we talk about researchers and developers, there is no shortage here of good specialists and interesting solutions. But, unfortunately, the level of technology of mass production and the element base being used are often unsuitable for the needs of the MVD. The weight and size of the produced equipment are large, the reliability is low. While enterprises of the defense industry prior to conversion turned their back on our needs. Therefore, in many matters we had to rely only on ourselves.

Many developments of our institute conform to the requirements of the times and the world level. For example, the Gvozdika M metal detector surpasses in its parameters a similar item of the Finnish firm that is the leader in this field. The individual bullet-proof garments, perimeter security facilities, and a number of others are also not inferior to foreign analogs. A workstation of the criminologist with the use of television equipment is now being developed. The point is that the human eye is imperfect. But by the special processing of a television image it is possible to compare documents, fabrics, sheets of paper, fragments of glass, and so forth. It is possible to distinguish 256 gradations of contrast, to color them, and to determine sizes and a large number of

other parameters. This is good support for the criminologist. It is possible to name many other interesting developments.

For a long time a number of main administrations, which poorly coordinated work with each other, were responsible for the technical supply of the services of the MVD. Each one was formed around its own deputy ministry. Therefore, the joining of plans, material and technical supply, and financing—everything was uncoordinated. But recently in the Collegium of the USSR MVD the task of putting this work into order for the purpose of pursuing a unified scientific and technical policy was set for the minister. In particular, it was decided to reinforce the Communications and Special Equipment Administration, to rename it the Operational Technical Administration (OTU), and to make it responsible for the scientific and technical support of all the services of the ministry.

The coordination of work now falls to the scientific methods council of the ministry, which is made up of competent experts (including outside ones, who do not work in the system of the USSR MVD). The council is subordinate to the deputy minister for scientific work. The Operational Technical Administration, which deals with scientific and technical matters, is also subordinate to him. The system is still far from perfect. The questions of scientific and technical support at the level of the oblast and city thus far have not been settled, but the correct direction has been taken.

Everything is being assigned to this system: the submitting of orders for new equipment, its development, assimilation in industry, and introduction at organs of internal affairs. It has become clear who is responsible for equipment. But previously some people ordered it, others developed it, still others paid for it.... Someone else should have introduced it. It is not surprising that the system of the technical equipment of law enforcement organs operated poorly.

As to the financing of the scientific and technical work of the USSR MVD, this question for the present remains for us a most sore subject. True, additional allocations were earmarked for the ministry, but they were spent for the most part on the acquisition of hardware, not on the development of new hardware. But it is necessary to finance development and delivery to production.

For example, we need space communications very much. Many sectorial ministries have it. But the MVD cannot take advantage of it, since it does not have the money for financing work in this direction. For this same reason we do not have portable cameras, the necessary video and sound recording equipment, special patrol vehicles, and much more.

The ideas of abolishing the militia emerged in general about 30 years ago. It is now difficult to say by what they were guided, but all the same these old trends, apparently, also determined the level of financing of organs of law and order.

The Ministry of Finance, true, is annually increasing financing by 10 percent of the achieved level. However, the initial level is so low, while the cost of development is increasing so rapidly, that this increase all the same is turning into a decrease.

For the accomplishment of the tasks, which have been set for the USSR MVD, it is necessary already now to increase by several fold the amounts of financing, which are being allocated for the development of special equipment and means of communication. And the same kind of increase is also necessary for the acquisition of these means, since the cost is constantly increasing. The involvement of enterprises of the defense industry in the supply of the USSR MVD would make it possible to increase the quality of special equipment, but this would be very expensive for the ministry.

For example, in accordance with the technical assignment of the institute, the Belorussian Optical Mechanical Association conducted scientific research work on the development of a small camera with a transistor-transistor logic system and a spring motor. A prototype was produced, the first photographs were excellent. Every operations worker needs such a camera. However, the manufacturing enterprise asked 2.5 million rubles for experimental design work and its delivery to production. But we do not have this money! Here we had to postpone development to better times, until the money appears. But the obtained solutions are beginning to become obsolete.

I will cite another example. Drug addiction has placed the country in an emergency situation. The fate of the nation, neither more nor less, is being decided. They announced a program to combat it. And at that time then Minister V.V. Fedorchuk issued the order within a year to develop, to assimilate the production, and to supply to organs of internal affairs equipment, which makes it possible to determine at long range narcotics and the fact of their taking. Incidentally, such means thus far do not exist anywhere in the world. In short, the incompetent decision, which was made for effect, without the allocation of financial assets and manpower resources for this was rather of negative importance.

At the USSR Academy of Sciences at our request they calculated that the initial amount of research on the problem of drug addiction (five years) would cost 24 million rubles. Thus ended the work with "large science" in this direction.

During the entire time they allotted to the institute about 200,000 rubles for the combating of narcotics. With this money they made a field kit for the determination of narcotics, which, moreover, is not worse than the foreign kit. In addition they developed an instrument for the determination of the degree of drug and alcohol intoxication, from the rate of contraction of the pupil—at the

level of an invention. They intend to use it now even... for the diagnosis of eye diseases at the clinic of S. Fedorov. A number of means for combating drug collectors have been developed.

Thus, the militia is going against the gangsters, who are armed to the teeth with first-rate equipment, literally with bare hands. Racketeers are obtaining for rubles and foreign currency weapons, vehicles, and electronic equipment. Is it perhaps worthwhile not to stint on seeing to it that the MVD would be capable of opposing to this arsenal the latest achievements of domestic science and technology?

Zelenograd Called Soviet Equivalent to 'Silicon Valley'

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No 1-2, 19 Jan 90 p 14

[Article by V. Kamnev under the rubric "You Asked to Tell": "Our Own 'Silicon Valley'"]

[Text] "I heard that they intend to make Zelenograd a technopolis, a kind of domestic Silicon Valley, where the production of various electronic instruments will be concentrated. Apparently in this way the people of Zelenograd intend very quickly 'to overtake and surpass America.' Is this the truth? And if it is, how realistic are the plans of the people of Zelenograd?"

[Signed] M. Goldfarb, engineer

Novosibirsk

Yes, indeed, the people of Zelenograd are now discussing animatedly the plans of the transformation of their city into a technopolis.

Strictly speaking, Zelenograd was a technopolis long before Silicon Valley emerged and even before they invented this term in Japan: Enterprises of the Ministry of the Electronics Industry have been concentrated here since the 1950's. But, of course, this was entirely the wrong technopolis: The result of absolute monopolism, it resembled what they understand in the West by a technopolis no more than a corpse resembles a person dancing the flamenco.

What is a technopolis? Literally this means a city that specializes in scientific, technical, planning, and design activity. And here everything is all right with Zelenograd—nearly all its enterprises, as was already said, work for the electronics industry. True, the causes of the emergence of technopolises "there" and "here" are different. Our departments took a fancy to the reorganization of production, it must be assumed, mainly due to the simplicity of the management of the sector. The leading industrial countries, in developing their own science-intensive industries, arrived at the same thing first of all due to the need for intensive scientific and technical relations of specialists of different types with each other and with industry. A special, what is called

"soft," infrastructure, which includes a telecommunications network, information support, the training of personnel, and the corresponding service, is required in order to support such interaction. The scientific and innovation firms, which constitute the basis of the modern technopolis, are interconnected by precisely such an infrastructure. Second, territorial proximity makes it possible to save substantially on the time for introduction—the most important condition for success in science-intensive sectors. Whereas in the USSR introduction is drawn out for years and decades and in the United States it is drawn out for months and weeks, in Silicon Valley days and at times literally hours are spent on this.

Different causes lead to different consequences. Today the technopolis according to western concepts is a unified whole, something living, which develops at a pace that the Soviet engineer has not dreamed of. This is an organism, which consumes the latest information, generates it itself, and immediately converts it into "iron." This is a city, which forms a special social type of worker—one who is always prepared for the acceptance of new knowledge, abilities, and skills and always seeks changes. Finally, this is...I do not even want to say it...the highest standard of living, because, after all, it is also necessary to attract a high-class specialist for work in the suburb.

All this is there, "in their country." Our administrative system for decades fenced off its technopolises, more precisely, quasitechnopolises (there are many of them: During the 1950's and 1960's about 60 of them were established in suburban Moscow alone) from the world market and from even any hint at competition. Our technopolis is frozen forms, the lack, especially in "boxes," of any exchange whatsoever of scientific and technical information, utter and complete military secrets, complacency, the conviction that in our own country we are the most advanced.... But in reality in the field of electronics we have fallen a decade behind the leading countries; if you also take into account the pace, at which we are developing, it is in general "forever." If we use the rate of exchange that has actually formed in electronics (10 rubles per dollar), our entire country produces computer hardware and spare parts for it worth \$600 million a year (according to the 1987 data), which corresponds approximately to 70th place in the world among firms that produce electronic equipment. Our technopolis is the extremely low quality of products and their inability to compete even given the feudally low cost of Soviet manpower. This is economic sluggishness, the lack of a standard of marketing, economic illiteracy.... This, finally, is a standard of living, which everyone knows.

For a long time and to this day Zelenograd has lived relatively well—there is nothing with which to compare itself, there is no one, thank Thee, Lord, with whom to compete. But then the "iron curtain" was raised a little, western electronics, though not yet in too rapid a stream, still began to flow to us. And the prospect of economic

collapse began to appear before Zelenograd. Its products cannot contend on any terms with western products. Neither a high nor a low rate of exchange of the ruble will save it. In the former, unlikely case (for example, a ruble per dollar) no one will buy a Soviet computer, if a foreign computer is more reliable, less expensive, and of better quality. Given a low rate of exchange (15-20 rubles per dollar) it will be possible to maintain the competitive ability of a product for some time due to its low cost, but then the modernization of production, the cost of which due to the low rate of exchange will leap to the billions, will be required—where, tell me, is the simple Soviet enterprise to get such a ghastly amount of money? It is no good for Zelenograd to rely either on its former magic wand—military orders (let us remember conversion and disarmament)—nor on major foreign contracts. In short, prospects that are far from glowing.

It is easy to predict that the failure of Zelenograd enterprises will result in unemployment and, as a consequence, a sharp increase of crime and social tension....

What is the solution? There is just one solution—the quasitechnopolis should as quickly as possible get rid of the prefix "quasi." Zelenograd specialists, representatives of the Zelenograd Initiativa Fund, and a group of associates of the USSR Academy of Sciences (economists, sociologists, and others), having gathered in November 1989 at an organizing assembly, came to this conclusion. The concept of the transformation of Zelenograd into a technopolis was formulated there.

It turns out that it is possible. In Zelenograd there is practically everything that is needed for the establishment of a technopolis—the pronounced scientific production specialization of the region, the existence of an intellectual potential and the proximity of a large city, a developed network of scientific research centers, and much, much more, which is required, for example, according to the standards of the Japanese Ministry of International Trade and Industry.

Specialists are allowing no more than five years for the transformation of Zelenograd into a technopolis which is capable of successfully competing with the advanced electronics industry of the West. The first phase of this transformation—"accumulation"—will last approximately 1.5-2 years. During this time the enterprises of Zelenograd, making the maximum use of the lack of saturation of the market and the lack of competitors, should earn assets which are sufficient for the future modernization of production. The next phase—"reorganization and modernization"—is even shorter. It will take 1-1.5 years. In this time each enterprise, having chosen for itself the most reasonable and efficient form of organization (joint-stock, leasing, cooperative, and so on), should prepare for the manufacture of a competitive product. And, finally, the third phase is "robust life under the conditions of fierce competition and a market system of management." By this time, as the authors of the concept believe, Zelenograd enterprises will have

become firms of the average world level. While subsequently everything will depend on the enterprise and industry of those who work at these firms.

"It was simple on paper," the reader, who has been schooled by our numero is grand construction projects in impenetrable skepticism, will say. But it is not that simple on paper. The rough, most simplified arrangement, which was cited here, is just a fragment of the program, which concerns only the reorganization of existing enterprises. The Technopolis Program, which was formulated for Zelenograd, is comprehensive. It touches on legal and ecological questions, in it much space is devoted to education, construction, housing, numerous (and very radical) social programs, interrelations with local and central authorities, the institution of a special economic status for Zelenograd ("a free economic zone"), and so on and so forth. Here, for example, is how the problem of the potential brain drain abroad is solved in the Technopolis Program—this problem will become extremely urgent in case of the explosive expansion of international relations, which is envisaged by the concept of the technopolis. It is solved unambiguously. The only possibility to retain a high-class specialist is to provide him with a high wage (even up to 100,000 rubles a year) and Zelenograd with a high standard of living, which is comparable to the western standard of living. Here, true, the problem of "purchasers" arises—people from less wealthy oblasts will rush here for food products and goods. Consequently, it is necessary to protect the high standard of living with a high cost of living. But so that residents with a small income would not suffer in this case, it is necessary to implement a large number of social programs.

In concluding, I want very much to convince the readers that the Technopolis Program is correct, that all the submerged rocks are taken into account in it, and that in five years, if it is followed, we will have without fail our own technopolis, perhaps, the first real offspring of perestroika. But I am not an expert. This is simply, in my opinion, a very convincing program. I do not have any objections to it. I want very much to believe that it is practicable, but the future will show to what extent this is so.

USSR Scientists Union Receives Official Recognition

90740126A Moscow NTR TRIBUNA in Russian
No 1-2, 19 Jan 90 p 14

[Article by Candidate of Geological Mineralogical Sciences N. Shilin, cochairman of the board of the USSR Union of Scientists, under the rubric "You Asked to Tell": "The USSR Union of Scientists Has Been Recognized"]

[Text] "In one of the summer issues of NTR there was a report on the constituent assembly of the USSR Union

of Scientists. Tell me, please, was it possible to officially register this union and what steps are being planned in it?"

[Signed] V. Rogozin

Perm

Candidate of Geological Mineralogical Sciences N. Shilin, cochairman of the board of the USSR Union of Scientists, gives an account.

An expanded plenum of the board of the future union was held in September. There the structure of the new organization—the sections, commissions, and so forth—was established and the three cochairmen of the board were elected. Doctor of Economic Sciences Professor B. Rakitskiy, Doctor of Physical Mathematical Sciences Professor A. Yelyashevich, and I became them.

But although the USSR Union of Scientists had thus already acquired real outlines, it still did not have a formal status, which gives it the right to an account at the bank and a seal—necessary attributes for successful activity in our country.

We understood this perfectly well and, therefore, began to prepare for registration of the union immediately after the constituent assembly. Unfortunately, this procedure for the present has not been worked out at all, since due to the lack of a new law on public organizations it is regulated to this day by decrees and instructions, which was adopted back in the 1930's!

We began our attempts by appealing to the Committee for Science, Public Education, Culture, and Training of the USSR Supreme Soviet. There they actively supported the idea of establishing the union, although they were unable to register it—due to the lack of precedents and the reluctance to create them before the passage of a general law on public organizations. They advised us to appeal to the USSR State Committee for Science and Technology. But there as well, alas, they did not have any practical experience and recommended that we try in the Central Committee of the Public Education and Science Workers Union. In the public organization they would not take bureaucratic conventionalities into account. The presidium of the central committee of this trade union made the corresponding decision, and in a few days we received a certificate on the registration of the USSR Union of Scientists, while the text of our charter was returned to us with the seal and signature of R. Papilov—chairman of the central committee—on every page.

Thus we ceased to be not formally recognized people and acquired the normal status of a public organization. This, incidentally, made it possible to nominate A. Buloshnikov, a member of the board of our union, as candidate for people's deputy of the Russian Federation from the USSR Union of Scientists.

Now about the immediate prospects of the activity of the union. I would not want to talk now about purely

scientific work, which is already being developed to the utmost in various sections—this is a theme for a separate conversation. As for organizational measures, an expanded plenum of the board of the union will be held on 12-16 February. There it is proposed to discuss the problems of perestroika in science (the opinions of many scientists were gathered and analyzed by means of socio-logical questionnaires), to plan the time and place of the holding of the next congress of the USSR Union of Scientists (tentatively in the spring or summer in Leningrad), to examine numerous applications on admission to the union, and to settle questions that are connected with the organization of its regional affiliates and local units.

The point is that we had already received tens of letters—individual and collective—with a request concerning admission to the union or the organization of a unit of it in one city or another. For the time being, until the official recognition of the union, the activity on its expansion was naturally curtailed, but now is the time to engage in increasing its ranks.

Moreover, in conformity with the charter we hope to begin publishing activity. The work on the first issue of the journal *MYSL*, which should be published at the end of this year, is now being completed. It is also planned to put out other publications of both the journal and the newspaper type.

Sociologist Discusses Opinion Polls on S&T Cooperatives

907A0139B Moscow *POISK* in Russian
No 4 (39), 25-31 Jan 90 p 3

[Article by Candidate of Philosophical Sciences Svetlana Bykova, the Institute of Sociology of the USSR Academy of Sciences, under the rubric "What Is Science To Be Like?"; "A Place Under the Sun"; first five paragraphs are *POISK* introduction]

[Text] "They should rid science of these cooperatives! They take the developments of others and sell them at 'contract' prices. They forget to come to an agreement only with the author of the stolen idea—at times the entire collective of a scientific research institute.... It is time to ban this self-willed child, while inflation has not broken loose to the utmost."

"But should it perhaps be the other way round—permit all scientists to work, as in a cooperative, without financial fetters and an administrative bridle? I am certain that scientific results will appear in the same abundance as 'faded' jeans...."

"Of the same cost and quality?"

Such disputes easily flare up now both in the lobby of the presidium of the USSR Academy of Sciences and in the corridors of any provincial scientific research institute. Opinions are popular, while information is scant. And besides, it is insufficient for an elementary analysis.

Therefore, we turned to the Institute of Sociology of the USSR Academy of Sciences, where Candidate of Philosophical Sciences Svetlana Bykova agreed to share her research with our readers.

First let us distinguish the idea from the embodiment. The establishment of a cooperative sector in the state, where the administrative system of management requires radical modernization, is inevitable. However, one must do this with allowance made for the forecast of the consequences of the development of the alternative economy. Otherwise free enterprise will turn into anarchy and will provoke a new assault of despotism on the part of state organs.

Personnel

Judging from a study conducted in one of the rayons of Moscow, very skilled people came to work at cooperatives. The overwhelming majority of them have a higher education, one in four is a doctor or candidate of sciences. Practically everyone in a cooperative works in his specialty. The average age is mature, a little older than in science as a whole. There is a significant share of retirees and those who are close to retirement age. Cooperatives are not experiencing a shortage of personnel, there are many people who want to work there—but mainly temporarily, under a labor agreement. They are afraid to agree to a permanent job—they will suddenly close the cooperatives.

The opportunity to earn legally by their intelligence and knowledge so much as to provide themselves and their family a worthy standard of living attracts people. And here is an interesting detail. When you talk with the chairmen and members of cooperatives about the principle, according to which personnel are selected at their place, you hear: Professionalism is in first place. The same quality, the prestige of which in society is absolutely inadequate. Then comes honesty—you will not manage without confidence in the common cause, which is firmly bound by the material interests of each person. But here, too, there is an obvious shortage in society. And only after that are there initiative, efficiency, and collectivism. Moreover, they group with professionalism first of all practical qualities and talent, they attach little importance to contact and sociability, affiliation with "one's own people" is of practically no importance.

But from the point of view of the associates of institutes, not the members of cooperatives, the main thing in case of selection is activity, initiative, and affiliation with "one's own people." In the opinion of half of those surveyed, the demands on the skills of a worker both at a cooperative and at an institute coincide. A third believe that at a cooperative the demands are higher, and only six percent assert the opposite.

However, it is now impossible to say that the best minds of science work at a cooperative. First, this work is extra work and, consequently, work that requires good health. Second, in public opinion, especially among scientists, there is prejudice against it (which often has a real basis).

Third, cooperatives for the most part are oriented toward the accomplishment of narrow applied tasks, and far from all scientists can find at them employment for themselves. For the most part this is even not scientific, but engineering activity. The cooperative usually does not conduct research as such, an end result, which it is possible to sell, interests it. Of the scientific products this is only the so-called soft product—computer programs and documentation. It is paid for rather well at the cooperative, but it does not have guarantees that it will be embodied in specific machines, structures, and products—that is, precisely in the goods, due to the lack of which this entire economic merry-go-round was organized.

Nevertheless, people rarely leave a cooperative. Usually they leave for another cooperative. Among the associates of institutes 40 percent of those surveyed would like to work at cooperatives of the sphere of science; the same number thus far have not determined whether or not they want this; and 20 percent do not intend to work there. Precisely they give an extremely negative evaluation to everything that is connected with the cooperative movement.

People know little on the side about the activity of cooperatives. Of the surveyed associates from guarantor institutes 20 percent believed that there were no cooperatives attached to their scientific research institutes. And 26 percent did not know whether or not there were any; moreover, even members of the party committees and party bureaus are among the uninformed. From this it follows that they are trying not to enlarge on the activity of cooperatives attached to scientific research institutes. In the opinion of cooperative members, scientific associates treat them best of all, then follow engineers, middle-level managers, and the administration of institutes. Among technical personnel and laboratory workers, they believe, a negative attitude predominates.

The Work Routine and Remuneration

It is difficult to say whether there is an objective basis for envy. The workday of members of cooperatives is increased on the average by two to three hours in addition to the eight-hour workday at the institute. Plus all of Saturday, or else Sunday as well. It can be said that they work as much as is necessary. This, of course, makes it possible to settle production questions more rapidly, but it is fraught with: first, rapid physical and mental depletion, the deterioration of health from overexertion. Consequently, it is fraught with the decrease of the professional potential and the quality of the work of the cooperative. Second, it has an adverse effect on the work of the state enterprise. Strength is not infinite.

Nevertheless, the organization of labor and discipline at the cooperative are significantly better, although the misfortune of our science—the weakness of the material and technical base—is also appearing here.

That is, cooperatives are striving for greater work efficiency by activating and stimulating the human factor.

There are no trivial meetings, all questions are settled for the most part within the subdivisions. Here there are also no endless checks on the part of enterprises and on the part of financial organs, but there are checks on the initiative of the cooperatives themselves.

Among cooperative members the overwhelming majority consider it just to pay a person as much as he has earned. Even though it is very much, the effectiveness should be real and not based on the poverty of society or leaps of the shortage.... That is, at this stage social consciousness rejects the very idea of the possibility of restrictions, even if people experience envy and frustration.

They see this problem in a completely different way in the collective of a scientific research institute. The remuneration of the labor of cooperative members is a genuine stumbling block. Only 22 percent of the associates of institutes consider it socially justified, 24 consider it to conform to the invested labor, 31 percent consider it to conform to the needs of our society, while the rest call it too high.

Of course, in science the possibility of comparing the results of the labor of individual people is extremely negligible. This causes subjectivism, arbitrariness, and discontent. All the cooperatives solve the problem in a standard way: salaries plus a bonus in accordance with the results of a specific job. Conflicts do not occur on this account, for they are fraught with dismissal. A self-seeking attitude is also not encouraged, inasmuch as, in the opinion of cooperative members themselves, in society they do not like their high wages, and it is now difficult to realize them legally. It is necessary, the most competent cooperative members believe, to channel a portion of the profit into the social development of cooperatives and to perform educational work, so that the members of cooperatives "would not go too far." However, the instability of the policy, which is being pursued with respect to them by management organs, greatly worries cooperative members. Hence their orientation toward immediate gain and a lot of money, and not toward long-range goals.

The hot money of cooperative members today is the cost of the lack of competition and a consequence of the universal shortage. A change of the situation will also immediately affect the remuneration. But for the present the range of the amounts is large even within one cooperative: According to the data of the study, the ratio of the minimum and maximum remuneration of the labor of personnel can come to 1:25.

The unexpectedly high revenues of cooperatives are bringing them not only joy. Parasitism—when cooperative officials are forced to retain among their members those who do not work at the cooperatives, but have the potential to influence their existence—is appearing. This is legal bribery, a bureaucratic racket. Personnel of

material and technical supply and overseers from ministries, the militia, financial organs, and the same guarantor enterprises may be among its representatives.

It is correct, but useless to say that it is necessary to combat this phenomenon. Such are the conditions of the existence of cooperatives now, and they govern their actions. When they become truly independent of outside organizations and economically independent and acquire their own material and technical base—only then will it be possible to eliminate these negative phenomena.

Exploitation—the appropriation of the surplus product that has been created by hired personnel—is an integral feature of cooperatives. The ratio of the members of a cooperative and the people, who work under labor agreements, which comes to 1:10 and often significantly more, also testifies to the possibility of its emergence and existence. But even such stratification is more convenient than the hopeless lack of money of a scientific associate at an ordinary scientific research institute.

This merits special attention. Society will hardly gain if talented researchers, with a theoretical mentality from basic science, move in a crowd into the sphere of introduction for the sake of earning a fit living.

Apparently, it is necessary to seek how to create equal opportunities for the efficient and materially secure labor of a scientist both at state institutes and at cooperatives. No, one must not enslave cooperatives in the same way as scientific research institutes, at which the system of organization requires radical restructuring, but, on the contrary, one must create for a scientist at a scientific research institute the conditions for normal labor. It is a matter, after all, not only of money. Cooperatives are helping to repair equipment, to make instruments, and in a few months to materialize developments that had lain about for decades. And everything is due to the attraction of specialists of different types from different spheres, remuneration by the job, the subordination of all assets to the ultimate goal....

But it is possible to regulate the large revenues of cooperatives by taxes, yet not simply in the abstract favor of the state, but in the favor of a specific science, scientific research institute, laboratory. Of course, it is possible (and necessary) to sell an idea to a cooperative at a contract price. But this is not the only form of compensation. It is possible to come to an agreement on a deduction from the profit for the sale of a science-intensive product of the cooperative. If it is substantial, it is worth talking about a fund for the development of basic science.

If you think hard, it is possible to think up many things. It is necessary merely to seek how to combine the interests of big science and its enterprising representatives for the good of society.

Letters Attack Academician Deputy 'Lobby'
907A0139A Moscow *LITERATURNAYA GAZETA* in Russian No 7, 14 Feb 90 p 2

[Letters to the editor]

[Text] Academicians of This World

We are afraid of the concept "lobby." From the pictures of "their morals," which remain in one's memory from childhood, it is well known: Lobbyism is a vile handiwork of mercenary bourgeois democracy.

However, today it turns out that peculiar "lobbies" are also not foreign to the Soviet parliament. In any case, several groups of deputies, who are united on a professional basis, have already emerged in it. One of them is what is called "the club of academicians," in which deputies from the USSR Academy of Sciences get together.

By tradition it is customary to regard scientists, and especially academicians, somewhat "unworldly." Someone is also striving to recall this after the statements of the academic "fractionalists" in the Supreme Soviet. Agricultural demands, for example, are far more comprehensible—give money, give equipment.... Unfortunately, the economy does not revive because of the criticism of concepts, while "advances and debts" do not develop into prosperity after the vigorous repulse of "unworldly theoretists."

The "academician club" is called upon to help unite intellectual and organizational resources for the better preparation and study of draft laws and for assistance to the commissions and committees of the Supreme Soviet.

[Signed] A. Peresvet

Ask Them Themselves...

The Russian Academy of Sciences is to be. The Presidium of the RSFSR Supreme Soviet recently adopted such a decision.

The establishment of its own national academy is also among the new structures, which are called upon to symbolize the process of the acquisition by the largest republic of the Union of its own character.

But this idea is not to the liking of everyone.

Among the critics of the project there is also such a powerful force as the academic deputy group. Not only because the proposal on this issue was not discussed in academic circles. The mechanism of the appearance of 450 new academicians, who are elected in several stages by an electoral college made up of 150 people, which in turn was selected according to nobody knows what principles, seems, in the opinion of the deputies, very involved and multistage.

Incidentally, the supporters of the project of the establishment of the Russian academy also have quite a number of arguments—historical, national, scientific, economic....

Yes, apparently, life should settle this not only academic dispute. But why not ask already now Russian scientists themselves? Their will, which has been expressed, say, in the form of a referendum, will provide at least a legal and moral base for one decision or another.

[Signed] A. Kakotkin

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*907A0122A Moscow NTR TRIBUNA in Russian
No 1-2, 19 Jan 90 pp 3, 4, 6*

[Advertisements]

[Text] The Novye informatsionnye tekhnologii Joint Venture

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New Rules for GSSR State Prizes for S&T

907A0131A Tbilisi ZARYA VOSTOKA in Russian
15 Jan 90 pp 1, 2

[Article: "In the Georgian CP Central Committee and the Georgian SSR Council of Ministers"]

[Text] The Georgian CP Central Committee and the Georgian SSR Council of Ministers approved the Statute on Georgian SSR State Prizes in Science and Technology and the Statute on the Committee for Georgian SSR State Prizes in Science and Technology attached to the Georgian SSR Council of Ministers.

The Committee for State Prizes in Science and Technology attached to the Georgian SSR Council of Ministers was charged to draft and approve letters of instruction on the procedure of the submitting and registration of works for the awarding of these prizes.

The allocation of assets for the rewarding of the winners of the State Prize, as well as for the expenses, which are connected with the examination of the submitted works, was assigned to the Georgian SSR Ministry of Finance.

The decree takes effect on 1 March 1990. In connection with this the previously adopted decrees on this question are considered null and void.

Statute on Georgian SSR State Prizes in Science and Technology

1. The Georgian SSR State Prize in Science and Technology, which hereinafter is called "the Georgian SSR State Prize," is awarded to individuals and collectives:

- for scientific research, which makes a significant contribution to the development of the humanities and the natural and technical sciences, speeds up the social and economic development of the republic, and brings Georgian science and technology up to the level of all-union achievements;
- for the most significant results, which were obtained during the implementation of state scientific and technical programs;
- for the development and the introduction in the national economy of the Georgian SSR of new types of equipment, materials, and technology, which in their indicators are equated with the best union and world analogs and ensure the acceleration of the pace and the effectiveness of the development of the economy of the republic, as well as for the development of resource-saving and ecologically clean technologies and the strengthening of the defensive capability of the state;
- for outstanding gains, which have been made in the matter of improving the quality of consumer goods;

— for the best textbooks and educational aids in the native language for higher and secondary specialized educational institutions, secondary general educational schools, vocational and technical schools, and the system of political and economic education of the working people, which have received the recognition of the community;

— to the leaders of socialist competition—workers, kolkhoz farmers, engineering and technical personnel, and specialists for outstanding labor and scientific and technical achievements.

2. The scientific works and textbooks, which have been submitted for the Georgian SSR State Prize, should be published not less than a year earlier, while the new types of equipment, materials, and technologies should be assimilated in the national economy prior to submission for the prize.

3. The Georgian SSR State Prizes are awarded annually in the following number: two prizes in science, two prizes in technology, two prizes for textbooks, one of which should be for higher educational institutions and one for secondary educational institutions, one prize for outstanding labor and scientific and technical achievements, which have been made in socialist competition in industry, construction, transportation, and communications, for gains in the improvement of the quality of consumer goods, as well as for outstanding labor gains, which were made in socialist competition in the area of agriculture. The amount of each prize is 5,000 rubles.

4. Works for the Georgian SSR State Prize are submitted by the presidiums of the Georgian SSR Academy of Sciences and republic scientific and scientific and technical societies, by the collegiums of ministries and departments, by the scientific and scientific and technical councils of associations, enterprises, scientific institutions, and higher educational institutions, by the assemblies of labor collectives, and by the public organizations of enterprises, associations, and organizations.

The materials on outstanding labor and scientific and technical achievements of the leaders of socialist competition for the prize are submitted by the Georgian Republic Council of Trade Unions jointly with the appropriate ministries and departments.

The works, which are connected with the increase of the quality of consumer goods, are submitted for the prize in consultation with the Georgian Administration of the USSR State Committee for Standards.

The textbooks and educational aids for higher and secondary specialized educational institutions, general educational schools, and vocational and technical schools should be submitted by the Georgian SSR Ministry of Public Education.

The submission of works and the selection of candidates for the prize should take place in an atmosphere of great demandingness on the evaluation of the work and the

labor contribution of each candidate, with the participation of the community at large, with the assurance of glasnost.

It is inadmissible to submit for the Georgian SSR State Prize a work, if the Lenin Prize, the USSR State Prize, the prize of the USSR Council of Ministers or the prize of the Georgian SSR Council of Ministers, as well as prizes named after prominent figures of science and technology have already been received for it (or it has been submitted for them).

5. The composition of the collective, which is nominated for the Georgian SSR State Prize for works in the field of science and technology and for textbooks, should not exceed six people; while the composition of the collective, which is nominated for the Georgian SSR State Prize for outstanding labor and scientific and technical achievements, should not exceed 10 people.

It is inadmissible to include in the collective of nominees people:

- only on an administrative, organizational, and consultative basis;
- if state awards have already been received for this work;
- if for another work they have been nominated for the Lenin Prize, the USSR State Prize, the prize of the USSR Council of Ministers or the Georgian SSR Council of Ministers;
- if the winner of the Georgian SSR State Prize has achieved new successes, the Georgian SSR State Prize can be awarded again, but no earlier than five years after the awarding of the previous prize.

6. People, who do not reside in the Georgian SSR or are not citizens of the Soviet Union, but performed work jointly with organizations of the Georgian SSR, in conformity with received plans and programs, and were nominated for the prize by these organizations in conformity with Paragraph four of this statute, can be included in the collective.

7. The works, which have been submitted for the Georgian SSR State Prize, are examined by the Committee for Georgian SSR State Prizes in Science and Technology, under which three permanent sections operate: for the natural sciences, the humanities, and technology.

The Committee for Georgian SSR State Prizes accepts works for the prize annually from 1 April to 1 October, while it accepts materials on labor and scientific and technical achievements of the leaders of socialist competition and for the prize for gains, which have been made in the matter of increasing the quality of consumer goods, to 25 January of the year of the awarding of the prize.

The submission of works and the drawing up of documents are carried out by the presidium of the Committee for Georgian SSR State Prizes in conformity with the approved letter of instruction.

8. The Committee for Georgian SSR State Prizes accepts all the submitted works and sends them for examination to its sections. On the basis of the materials of the study of these works by the sections the Committee for Georgian SSR State Prizes by 10 November by open ballot makes a decision on allowing the works, which have been submitted for the Georgian SSR State Prize, to compete.

Note:

Works, which have not been allowed to compete by the Committee for Georgian SSR State Prizes, cannot be resubmitted for Georgian SSR State Prizes, if a different provision has not been stipulated by a special decision of the Committee for Georgian SSR State Prizes.

9. The lists of the works, which have been allowed to compete, their authors, and the represented organizations, for the purpose of extensive public discussion, through GRUZINFORM are published in the republic press no later than 15 November.

10. The works, which are recommended for participation in the competition for the Georgian SSR State Prize, should be discussed extensively and comprehensively in the press, on television and radio broadcasts, at meetings of scientific and scientific and technical councils, and at assemblies of labor collectives. The nature of a debate should be lent to the discussion, clearly identifying the opinions and evaluations of the community.

The editorial boards of newspapers and journals, the Georgian SSR State Committee for Television and Radio Broadcasting, and the management of associations, enterprises, scientific institutions, higher educational institutions, scientific and scientific and technical societies, and public organizations should cover the discussion of the works. The materials of the discussion, the evaluations, reviews, remarks, and suggestions should be sent to the Committee for Georgian SSR State Prizes no later than 1 February of the year of the awarding of the prize.

11. The Committee for Georgian SSR State Prizes makes the decision on the awarding of the Georgian SSR State Prize and submits it to the Georgian CP Central Committee and the Georgian SSR Council of Ministers by 15 February of the year of the awarding of the prize.

12. The Committee for Georgian SSR State Prizes jointly with the presidium of the Georgian Republic Council of Trade Unions makes the decision on the awarding of the Georgian SSR State Prize to the leaders of socialist competition for outstanding labor and scientific and technical achievements and submits it to the Georgian CP Central Committee and the Georgian SSR Council of Ministers also by 15 February of the year of the awarding of the prize.

The decision of the Committee for Georgian SSR State Prizes takes effect after this decision has been approved

by the Georgian CP Central Committee and the Georgian SSR Council of Ministers. The decree of the Georgian CP Central Committee and the Georgian SSR Council of Ministers on the awarding of the Georgian SSR State Prize is published in the republic press on the day of the establishment of Soviet power in Georgia.

Note:

A work, which was allowed to compete for the Georgian SSR State Prize, but did not receive the prize, can be resubmitted in accordance with the general procedure two more times.

13. The title "Winner of the Georgian SSR State Prize" is conferred on the people who were awarded the Georgian SSR State Prize, a certificate and badge are presented to them in a solemn atmosphere at a meeting of the committee or in the labor collectives. In case of the awarding of the prize to a collective its monetary part is distributed in equal shares among the members of the collective.

14. The certificate and badge of a deceased winner of the Georgian SSR State Prize are presented as a keepsake to his family, while the monetary part of the prize is inherited in accordance with the procedure stipulated by Georgian legislation.

Statute on the Committee for Georgian SSR State Prizes in Science and Technology Attached to the Georgian SSR Council of Ministers

1. The Committee for Georgian SSR State Prizes in Science and Technology attached to the Georgian SSR Council of Ministers, which hereinafter is called "the Committee for Georgian SSR State Prizes," is formed of well-known scientists and specialists, while its composition is approved for a three-year term by the Georgian CP Central Committee and the Georgian SSR Council of Ministers.

2. The composition of the Committee for Georgian SSR State Prizes and information on the changes occurring in it are published in the press. There is assigned to the Committee for Georgian SSR State Prizes the making of decisions:

- a) on the awarding of Georgian SSR State Prizes in Science and Technology, as well as for textbooks;
- b) upon the representation of the Council of Trade Unions of Georgia on the awarding of Georgian SSR State Prizes to the leaders of socialist competition for outstanding labor and scientific and technical achievements.

3. The Committee for Georgian SSR State Prizes in conformity with the goal of its activity:

- a) sends to well-known scientists, specialists, and organizations notices with the request to inform the committee of all significant works and their authors, which are worthy of the awarding of the

Georgian SSR State Prize. The list of scientists, specialists, and organizations, to which notices are sent, is approved by the presidium of the committee;

- b) accepts the works, which are submitted for the Georgian SSR State Prize, and organizes their preliminary examination. Selects from them the ones most worthy of participation in the competition for the prize; publishes in the republic press the list of works, which have been selected for participation in the competition, and organizes their public discussion;
- c) examines the works, which have been allowed to compete, and analyzes the suggestions and remarks, which have been received with regard to them. Ensures discussion at any level in an atmosphere of creative debate, great demandingness, and adherence to principle. Here checks carefully and thoroughly the persuasiveness of the obtained results and conclusions and their scientific argumentation, on the basis of which it makes the decision on the awarding of the Georgian SSR State Prize and submits it for approval to the Georgian CP Central Committee and the Georgian SSR Council of Ministers;
- d) officially registers the certificates and badges of the winners of the Georgian SSR State Prize and presents them to the winners in a solemn atmosphere;
- e) pays the winners the monetary part of the prize.

4. The presidium, which is made up of 11 (9) people and is headed by the chairman, supervises the work of the Committee for Georgian SSR State Prizes. The Committee for Georgian SSR State Prizes consists of the natural sciences section, the humanities section, and the technology section, each is made up of not more than 21 members.

Between the meetings of the Committee for Georgian SSR State Prizes its presidium, which is elected by the members of the committee by open ballot, works.

The sections of the Committee for Georgian SSR State Prizes:

- a) select and approve reviewers for the preliminary examination of the submitted works and the adoption of recommendations and form expert commissions for individual fields;
- b) send the work, which has been submitted for the Georgian SSR State Prize, for examination to the Academy of Sciences, ministries, departments, associations, enterprises, scientific institutions, higher educational institutions, and other organizations. Request the services of well-known scientists and specialists of the national economy for the reviewing of the works which have been submitted for the prize;

- c) send to the members of the Committee for Georgian SSR State Prizes, experts, or expert commissions the documentation on construction and technical structures, inventions, designs, materials, and technological processes for familiarization with the state of their introduction and with the contribution of each candidate. The expenses for business trips are paid to the members of the committee and experts, in conformity with prevailing legislation, within the limits of the established estimate;
- d) keep track of the observation of the rules of the submission of works for the Georgian SSR State Prize and their expert examination and ensure the openness of this process.

The labor of the reviewers, experts, and auxiliary personnel is paid for at the rates which have been agreed upon by the Georgian SSR Ministry of Finance.

5. The presidium of the Committee for Georgian SSR State Prizes studies in advance the works, which are submitted for the Georgian SSR State Prize, prepares all the material for examination in the sections and at the meetings of the committee, studies and generalizes the materials of the public discussion, the reviews, and the critical scientific literature on the submitted works, carries out office work, as well as organizes statements of leading figures of science and technology in the press and

on radio and television on the works, which have been allowed to compete and have been awarded the Georgian SSR State Prize.

6. The meetings of the Committee for Georgian SSR State Prizes are convened no less often than twice a year. A meeting is considered competent if not less than two-thirds of the members of the committee are present at it. The decision of the Committee for Georgian SSR State Prizes on allowing the works, which have been submitted for the Georgian SSR State Prize, to compete is made by open ballot, while the decision on the awarding of Georgian SSR State Prizes is made by secret ballot, by a majority of not less than three-fourths of the votes of the present members of the committee.

Note:

If as a result of the first round of voting a decision on the awarding of Georgian SSR State Prizes has not been made, the holding of a second and third round of voting is permitted. The works, which gathered half and more of the votes of the participants in the voting, are admitted to the second and third rounds. If as a result of the three rounds of voting no work received the necessary number of votes, these works are eliminated from the competition, that is, the corresponding prize is not awarded to them.

7. The Committee for Georgian SSR State Prizes has a seal.

The Administration of Affairs of the Georgian SSR Academy of Sciences directs the financial activity of the Committee for Georgian SSR State Prizes.

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